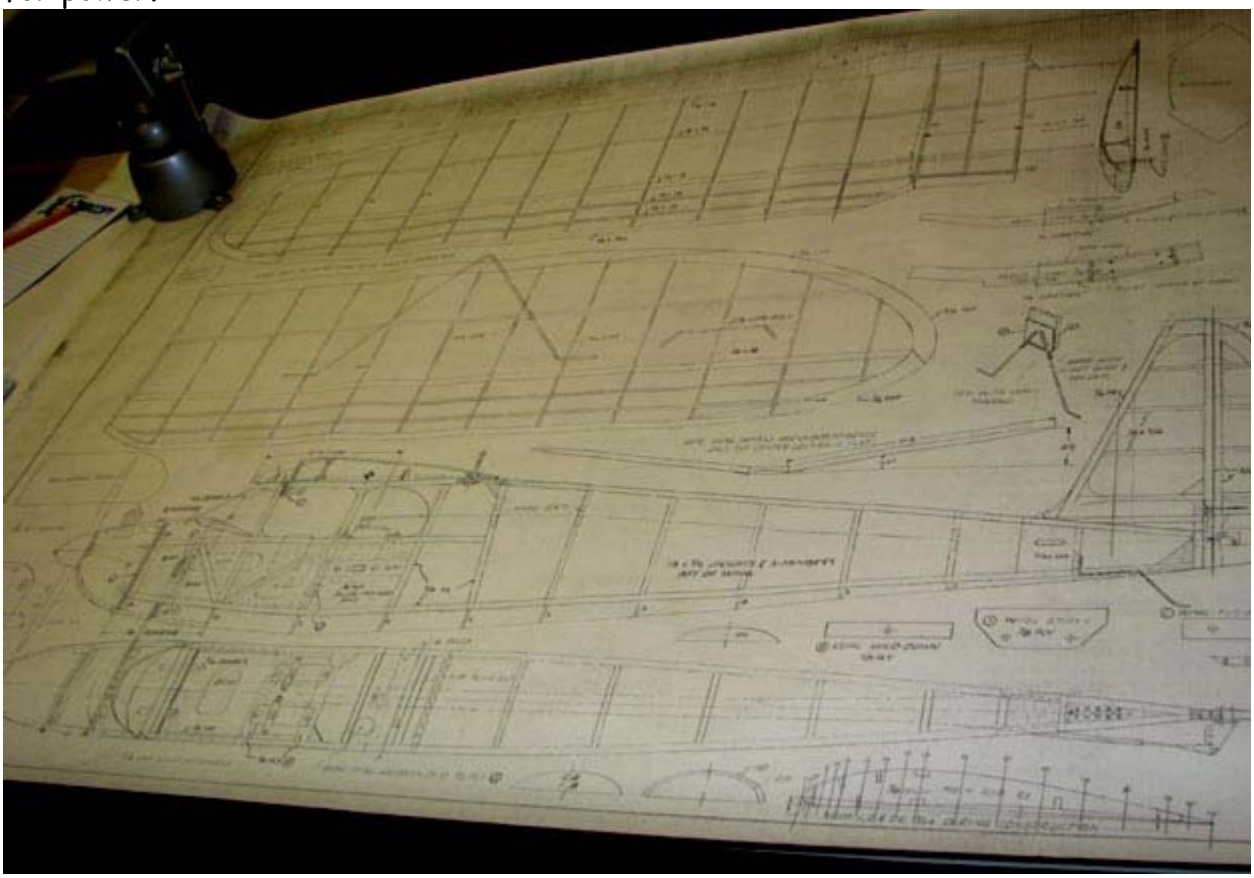
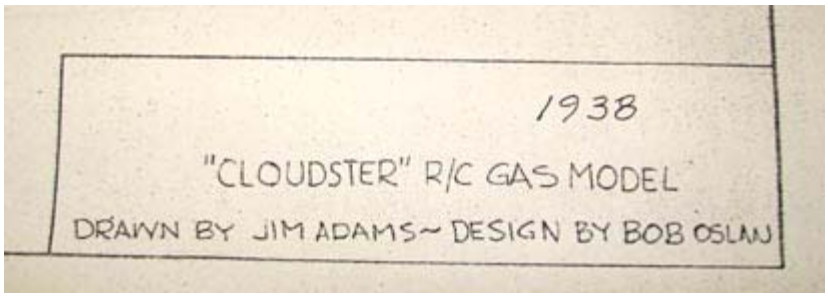
David Harding

From: Tandy C. Walker [tandyw@flash.net]
Sent: Saturday, October 24, 2009 9:47 AM
To: Harding, Dave
Subject: Cleveland Cloudster

Good Morning Dave,
While going through my collection of plans this afternoon, I ran across a set of hand drawn Cloudster plans shown below. A number of years ago Dick Huang ran me off a copy of his set that he had gotten from Jim Adams. Jim had apparently drew them up for 1/2A Texaco because the plans show an R/C version using a Cox .049 for power.



Shown below is the title block on these plans. The plan is dated 1938 so it would be an Antique and it is gas powered so it should qualify for the SAM Speed 400 electric event. However, before I scale these plans, I need some validation that this set of hand drawn plans would be legal for the Speed 400 electric event. Please respond.....Tandy


1938
"CLOUDSTER" R/C GAS MODEL
DRAWN BY JIM ADAMS~ DESIGN BY BOB OSLIN

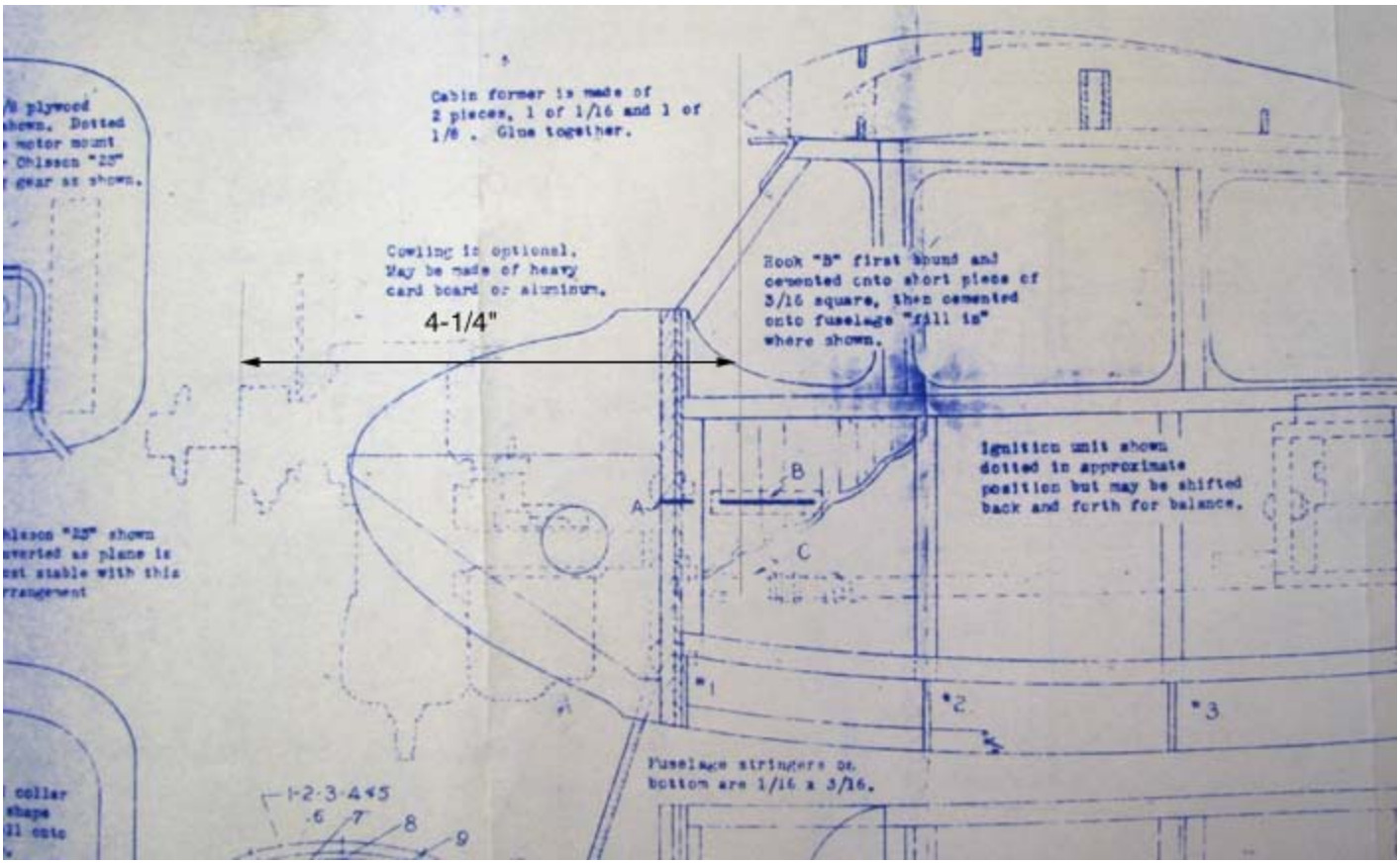
David Harding

From: Tandy C. Walker [tandyw@flash.net]
Sent: Saturday, October 24, 2009 3:34 PM
To: Wallock, Gene
Cc: O'Reilly, Jim; Harding, Dave; Hiner, Jack; Lollar, James; Lollar, James Shop
Subject: Cleveland Cloudster Plans

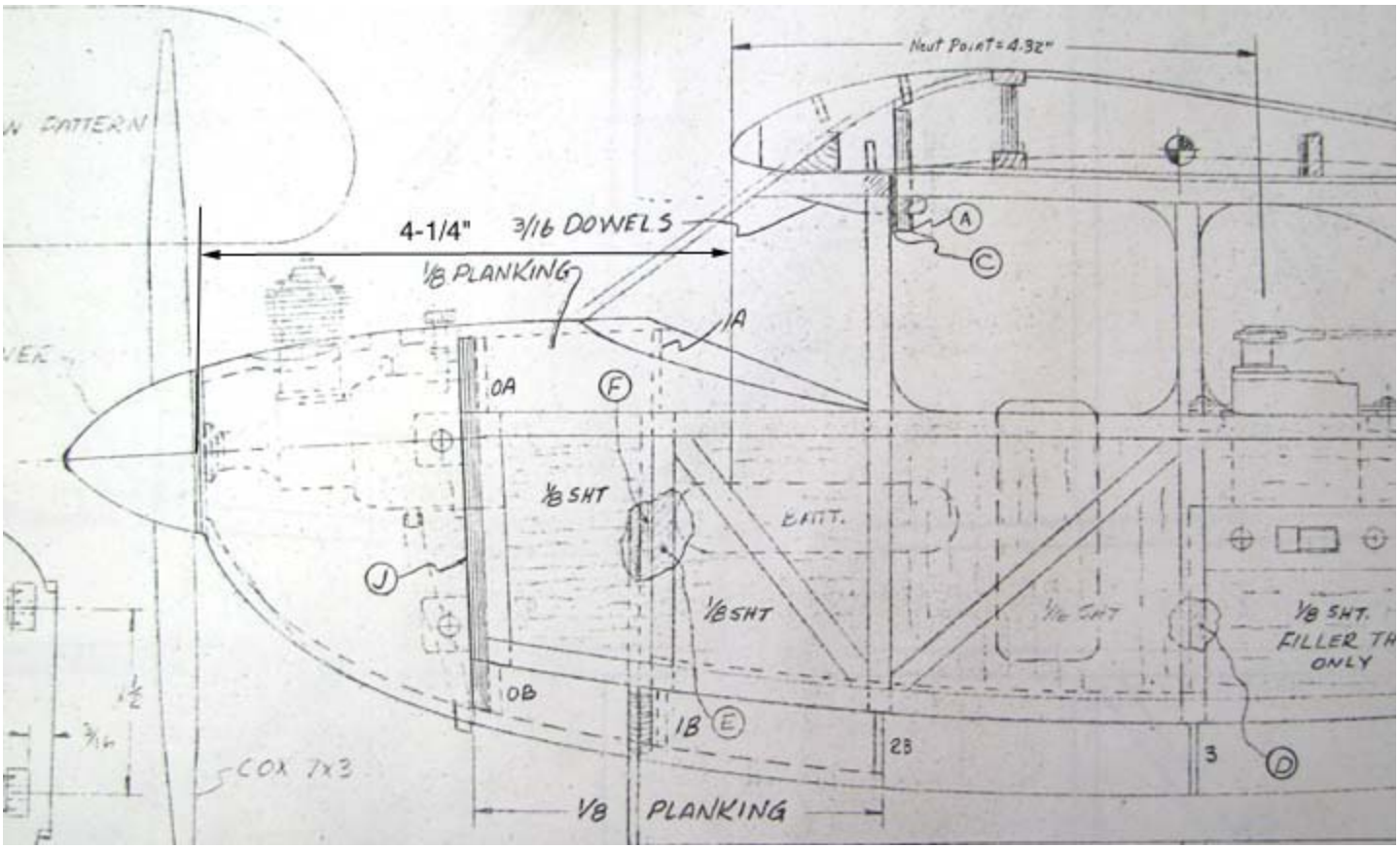
Hi Gene,
After I received your last message, I went through my old timer plan collection again today and found a set of actual Cleveland Cloudster plans that I had overlooked yesterday. The plan's title block is shown below as Plan Set No. GP-5004C, however, there is no date shown in the title block.

Looking over the plans, I discovered that they illustrate both wing dihedral on the left as well as wing polyhedral on the right as shown below. So I do not know if this plan set qualifies as an Antique or not, but it certainly is an Old Timer, which is all I need for the Speed 400 event.

I compared the Cleveland plan with the Jim Adams plan and the two check out OK, except for the nose section forward of the wing's leading edge. The Cleveland plan shows an inverted Ohlsson 23 ignition engine for power. The distance from the wing's leading edge to the rear face of the prop plane measures 4-1/4" as shown below.



For comparison, here we have the Jim Adams plan, which shows an upright Cox .049 engine for power. The front end has been modified and the firewall has been tilted for down thrust in the Cox engine. However, the distance from the wing's leading edge to the rear face of the prop plane is the same as the Cleveland plan (4-1/4") as shown below. So the Jim Adams plan also has the same nose moment as the original Cleveland plan. This is as good as I can do to show that the Jim Adams Cloudster plans are valid. I hope this comparison provides the proof you are looking for, but is the plan a Antique as the Jim Adams plan indicated (1938) or is it an Old Timer?.....Tandy


Keel Point = 4.32"
4-1/4"
3/16 DOWELS
1/8 PLANKING
1A
0A
F
1/8 SHT
BATT.
J
1/8 SHT
1/16 SHT
1/8 SHT.
FILLER TH
ONLY
0B
1B
E
2B
3
D
COX 7x3
1/8 PLANKING

David Harding

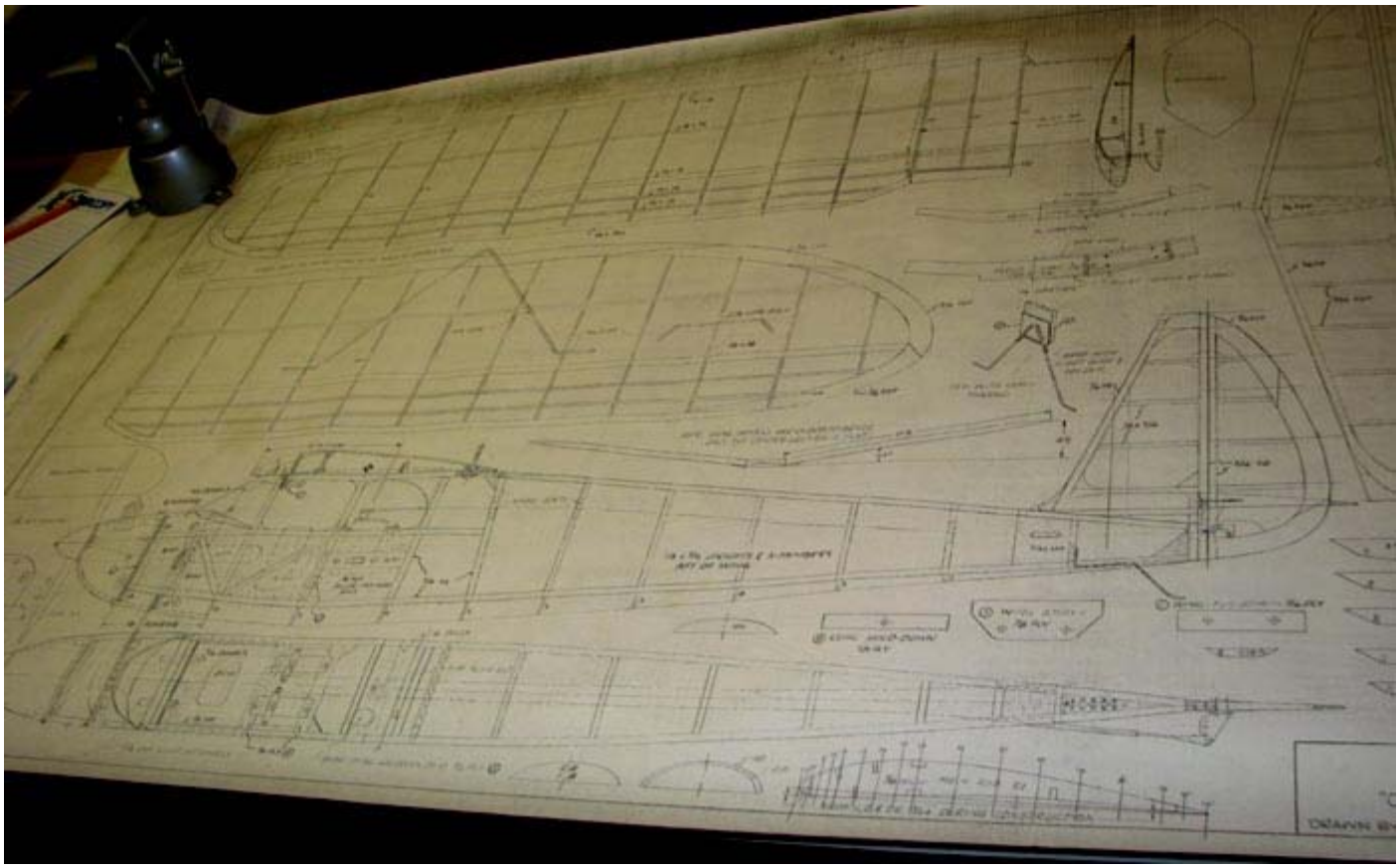
From: Tandy C. Walker [tandyw@flash.net]
Sent: Tuesday, October 27, 2009 11:29 AM
To: Undisclosed-Recipient: ;@smtp105.sbc.mail.mud.yahoo.com
Subject: 1 Speed 400 Cloudster - New Model Selection

Speed 400 Cloudster Project

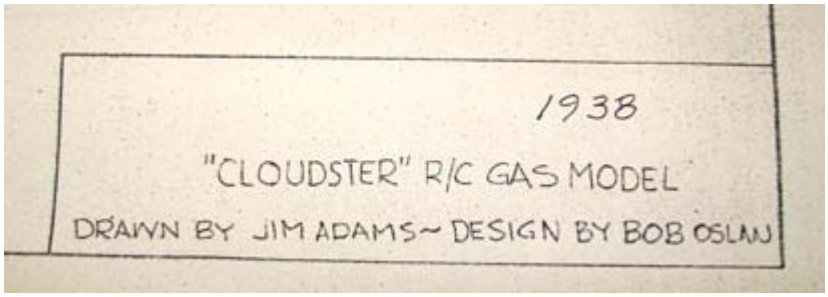
This first report intentionally contains the necessary documentation to justify the selection of the Jim Adams Cloudster plan for the SAM Speed 400 electric event.

After scaling the Baby Playboy plans and modifying the front end, fortunately Ned Nevels pointed out that it was against the Speed 400 rules to use the rubber version of the Baby Playboy plan. So I decided to discontinue the Baby Playboy project for my Speed 400 electric model.

I spent most of last week searching for another model suitable for the Speed 400 event. While going through my collection of plans, I ran across a set of hand drawn Cloudster plans shown below. A number of years ago Dick Huang ran me off a copy of the one he had gotten from Jim Adams, a long time experienced modeler and leader in the SAM movement. Jim had apparently drew these plans up for the SAM 1/2A Texaco event because the plans show an R/C version using a Cox .049 for power. Dick had very carefully calculated the plan's wing area to be 352.16 sq. in. and wing span as 51.70 inches.

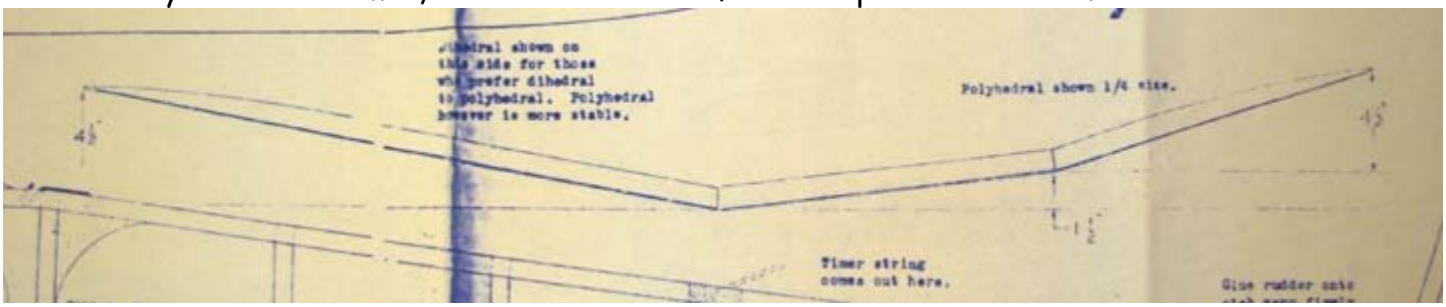


Shown below is the title block on these plans. If the 1938 date is accurate, the Cloudster should be an Antique and it is gas powered so it meets the SAM Speed 400 electric rules.

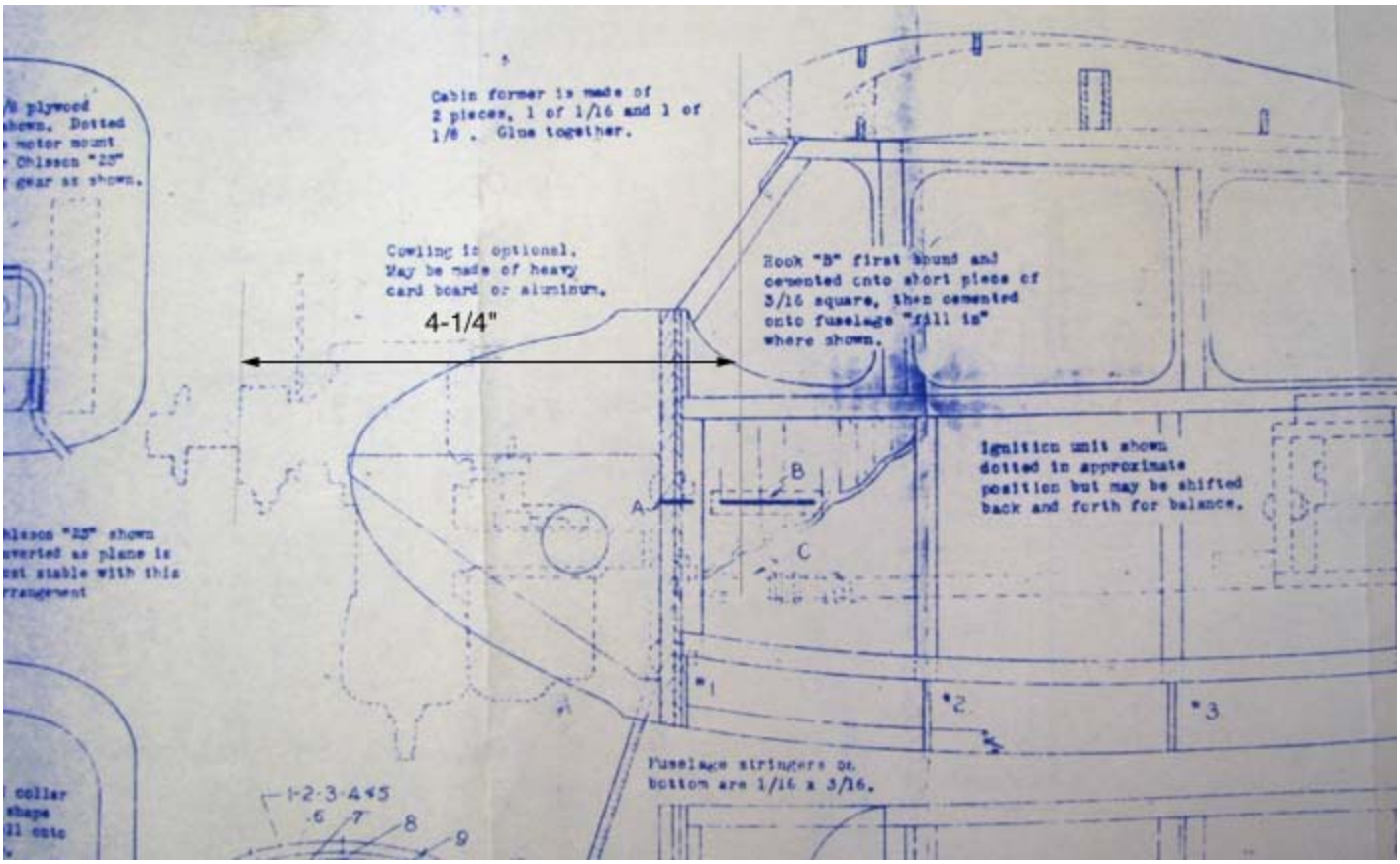


These Jim Adams plan was compared with a set of original Cleveland Cloudster plans whose title block is shown below.

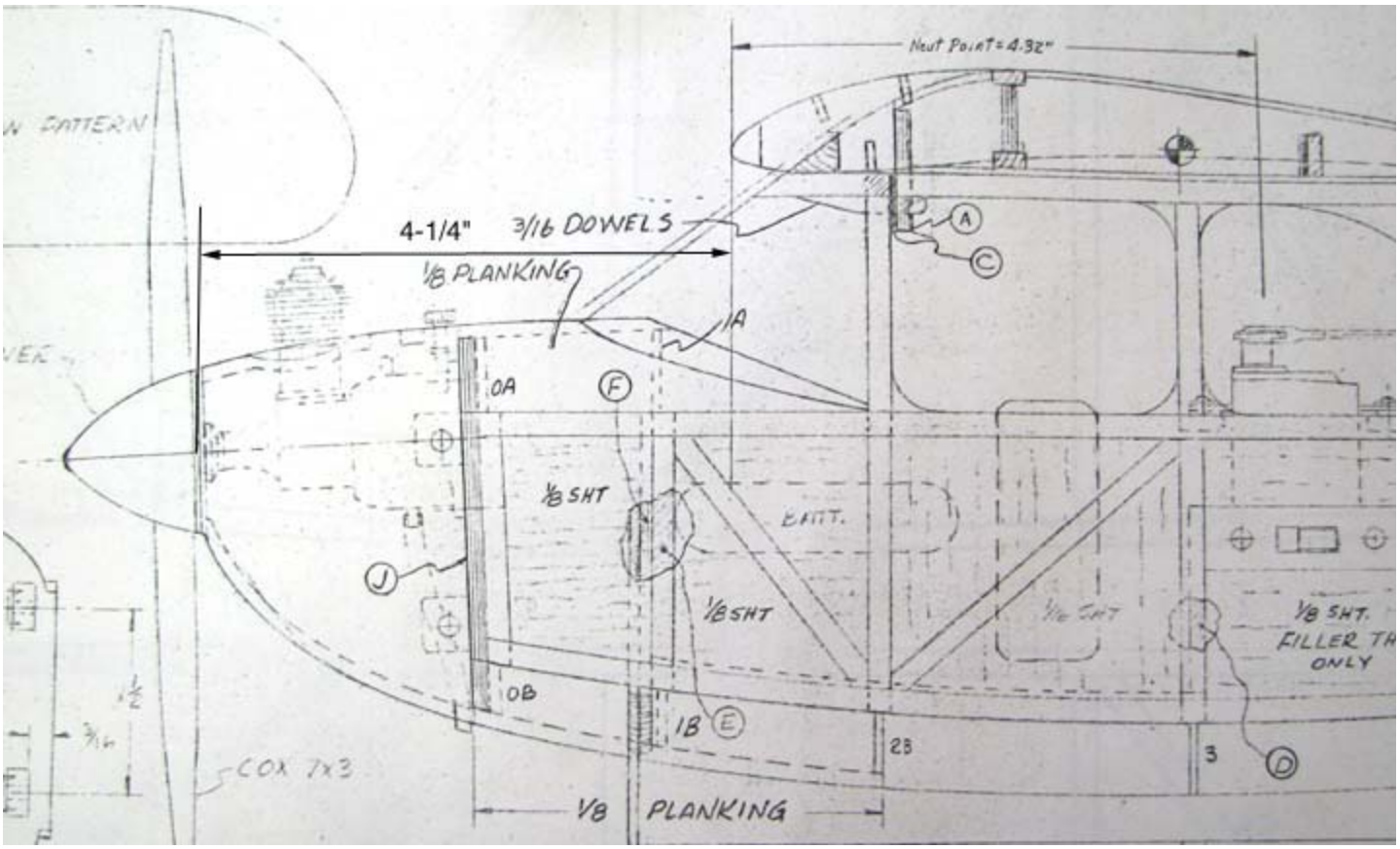
the Cleveland Cloudster plan illustrates both wing dihedral and polyhedral as shown below. Since there is no date in the title block, I do not know for sure if the Cloudster plan qualifies as an Antique or not, but it certainly is an Old Timer, which is all I need for the Speed 400 event.



I compared the Cleveland plan with the Jim Adams plan and the two check out OK, except for the nose section forward of the wing's leading edge. The Cleveland plan shows an inverted Ohlsson 23 ignition engine for power. The distance from the wing's leading edge to the rear face of the prop plane measures 4-1/4" as shown below.

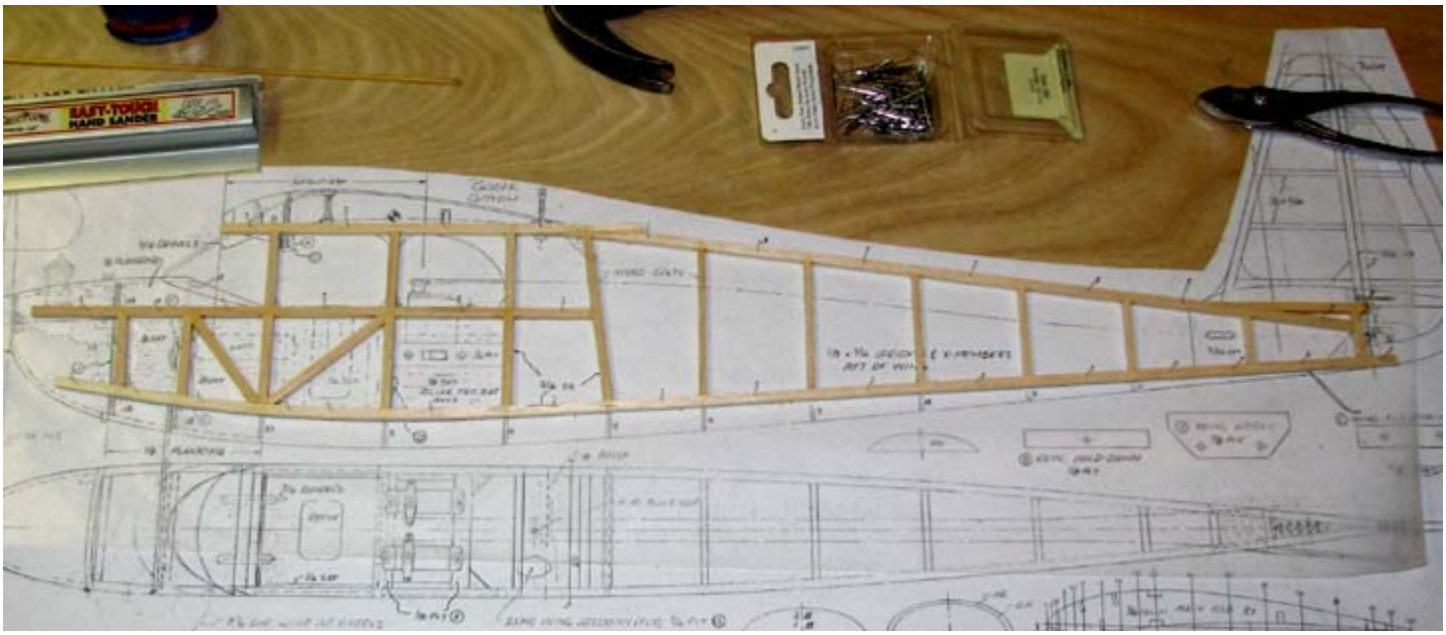


For comparison, the Jim Adams plan below shows an upright Cox .049 engine for power. The front end has been modified and the firewall has been tilted for down thrust in the Cox engine. However, the distance from the wing's leading edge to the rear face of the prop plane is the same as the Cleveland plan (4-1/4") as shown below. So the Jim Adams plan also has the same nose moment as the original Cleveland plan. After consulting with Gene Wallock, Dave Harding, Jack Hiner, and Jim O'Reilly several times, I have concluded that the Jim Adams plan qualifies for the Speed 400 event.



It was thought that the Speed 400 rules contained an 8 oz/sq.ft. wing loading requirement. However, during the Cloudster plan discussions, a surprise discovery was made that there is no wing loading requirement in the Speed 400 rules. As a result, I settled on a scaled down wing area of 300 sq. in. for the Cloudster. The scale factor applied to the plan is SQRT(300/352.16) = 0.923. Yesterday I had the plans scale down for a wing area of 300 sq. in. and I will build the Cloudster incorporating the polyhedral wing configuration.

So after all of these discussions, calculations, and comparisons, last evening I finally got started building something! :O< I laid up the Cloudster's first fuselage side using the scaled down plans as shown below. The longerons and forward vertical members are 3/16" square, however the aft fuselage vertical members are reduced to 1/8" X 3/16" to save weigh. Notice that I am building the fuselage with the down thrust built into the firewall as per the Jim Adams plan.....Tandy

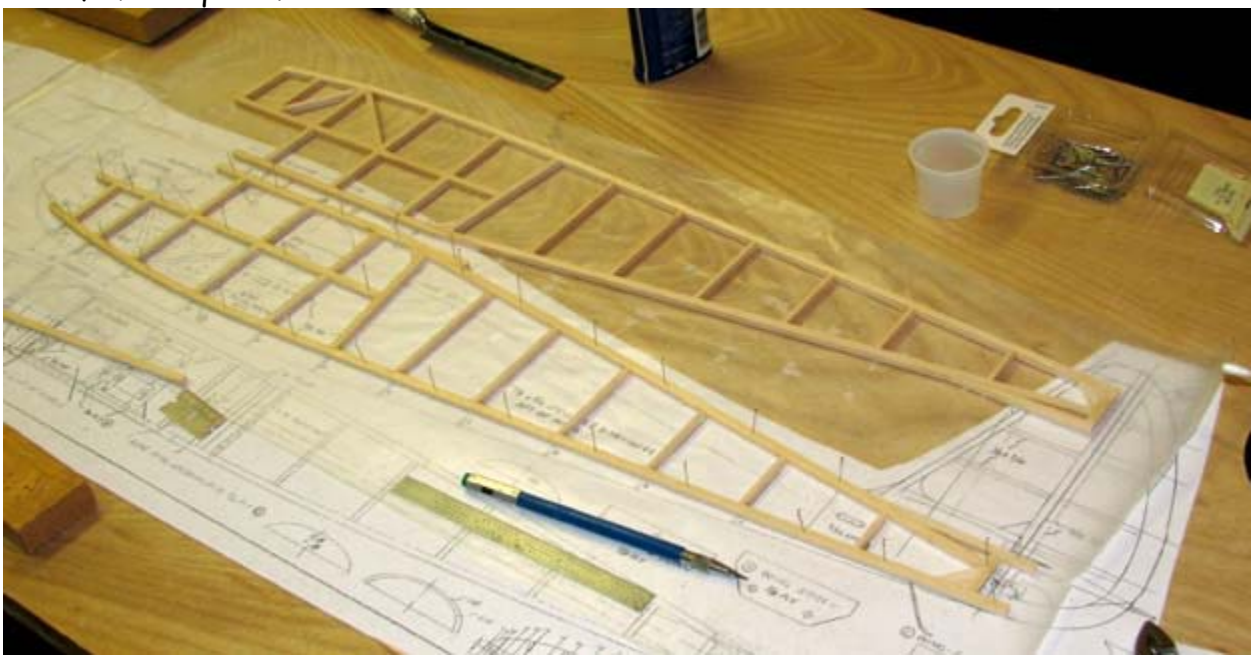

EAST-TOUCH
HAND SANDER

David Harding

From: Tandy C. Walker [tandyw@flash.net]
Sent: Tuesday, October 27, 2009 7:45 PM
To: Undisclosed-Recipient: ;@smtp101.sbc.mail.mud.yahoo.com
Subject: 2 Speed 400 Cloudster - Second Side

Speed 400 Cloudster Project

Sue and I had a lot going on today. We had to have the exterminators out to spray and dust for ants of all things. All of this rain we have been getting here in north Texas really has the ant population stirred up. We have a house keeper right now while Sue recovering from her injury and it was her day to clean the house. I took Sue to Arlington Memorial Hospital this afternoon for one of her physical therapy session. So I have not had a lot of time work on the Cloudster today, but I did manage to get the second side of the Cloudster fuselage laid up as shown below. The 3/16" sq. balsa seems a little large to me, but I selected pretty light wood ***(i.e., the two longerons together only weigh 5 grams)*** and the aft fuselage vertical members are reduced to 1/8" X 3/16" to also save weigh. If it turns out that the fuselage structure is too heavy when I get it framed up, I will go back and build another one out of 1/8" square.

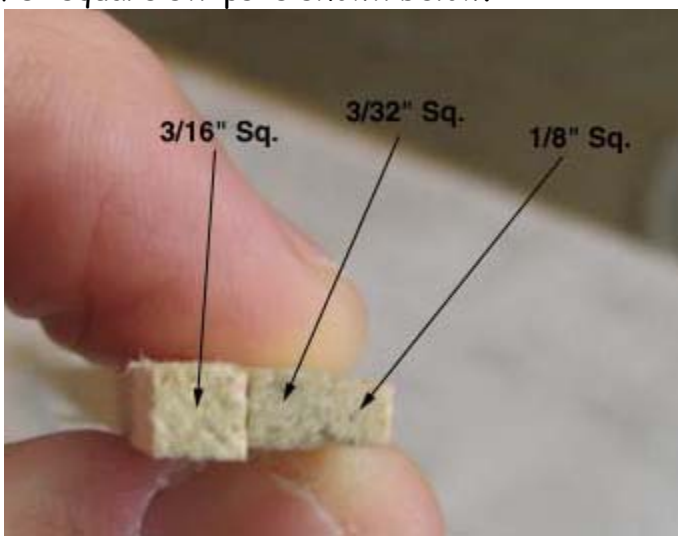


One item I forgot to mention in my first report. My friend James Lollar up in Ada, Oklahoma likes cabin models and asked me to send him copies of my Cloudster plans, which I did. I think he is considering building the 300 sq. in. version for the Speed 400 electric event as well.....Tandy

David Harding

From: Tandy C. Walker [tandyw@flash.net]
Sent: Thursday, October 29, 2009 2:10 PM
To: Undisclosed-Recipient: ;@smtp104.sbc.mail.mud.yahoo.com
Subject: 3 Speed 400 Cloudster - Test for Changing Wood Size

On Tuesday I received a one line e-mail from Jack Hiner that said:
"Tandy, 1/8 inch square spruce or hard balsa will work for longerons on a model this size.....Jack
After I received his message, I picked out some 1/8" square hard balsa strips to make new Cloudster sides with. However, about 15 years ago Dick Huang and I went over to MAL's hobby shop in Irving, Texas and had Edcor Sea cut us a hundred 5/32" square balsa strips each and I still have a supply. A size comparison between 3/16", 5/32", and 1/8" square strips is shown below.

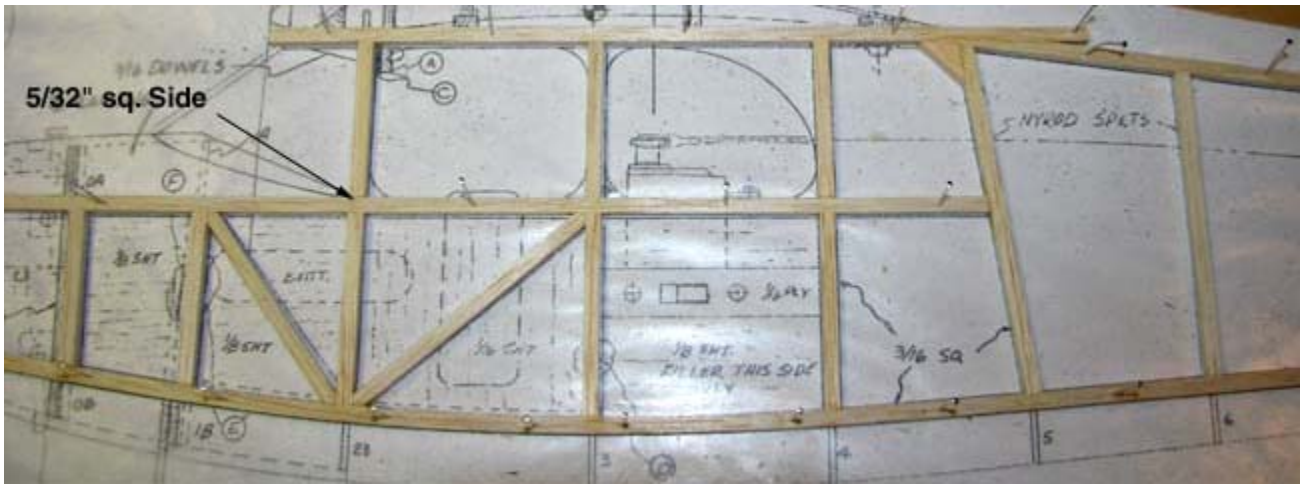


As it turns out the 1/8" square hard balsa strips weigh about the same as the 5/32" square medium balsa strips, but the 5/32" square strips have a little more mass to them. Several years ago I built up the cabin Playboy fuselage frame shown below out of a set of the 5/32" square medium balsa strips. This structure is about the size of the Cloudster and it weighs 21 grams or about 3/4 of an ounce.

After some discussion with Jack Hiner, collectively we decided that since the

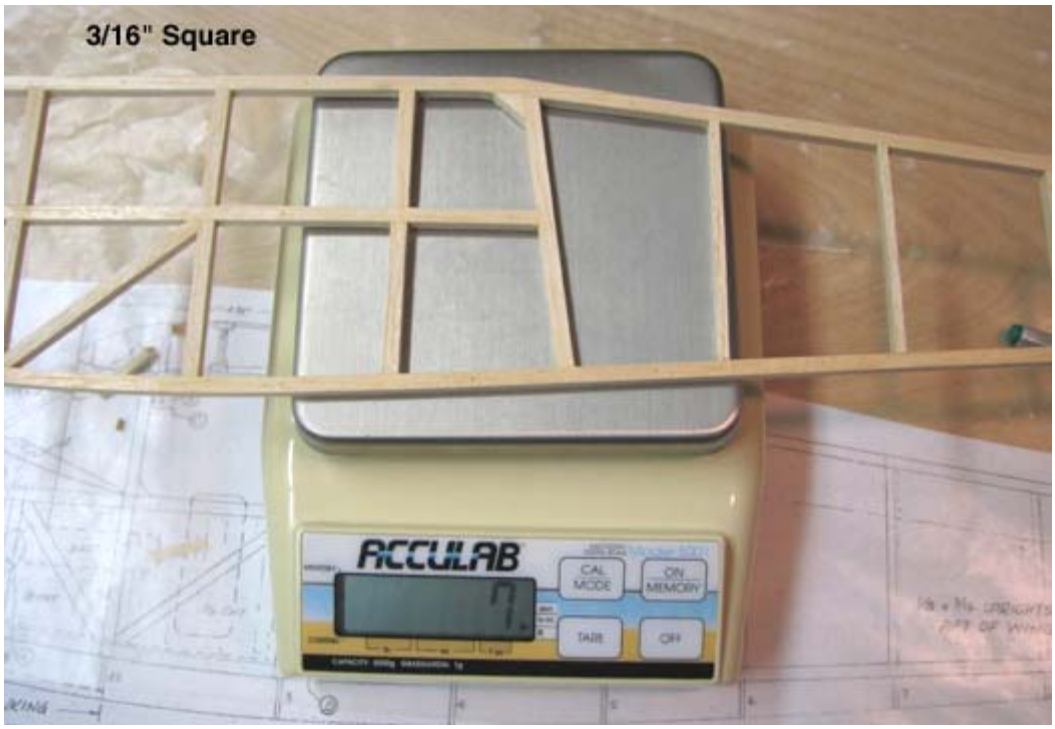
Cloudster does not have a real long tail like the Baby Playboy and does have short nose, the 5/32 is better choice. Besides, the 5/32 square will give more joint gluing area.

So last evening I laid up the first Cloudster fuselage side using 5/32" square balsa strips as shown below.

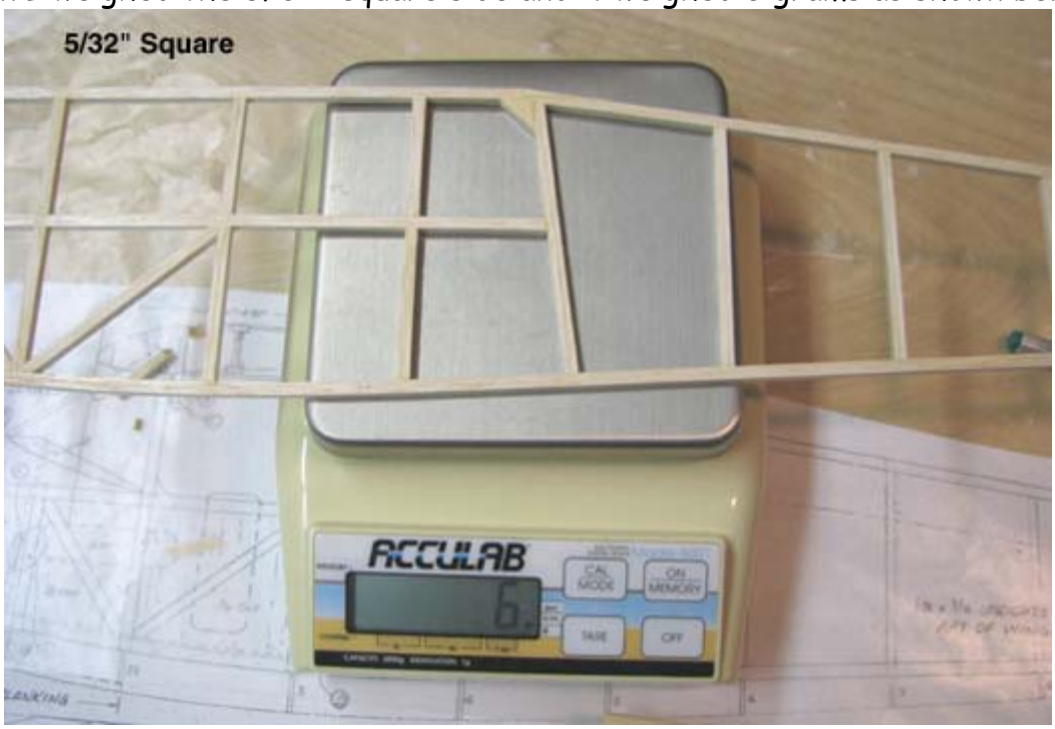


In the picture below, the 3/16" square two sides are at the top of the picture and the 5/32" square side is at the bottom.

I weighed the 3/16" square side on the AccuLab scale and it weighed 7 grams as shown below.



Then I weighed the 5/32" square side and it weighed 6 grams as shown below.



I was very surprised to find that there was only one-gram weight savings by using the smaller 5/32" square balsa strips! I guess part of the reason there is so little difference is the reduction from 3/16" square down to 1/8" X 3/16" for the vertical members in the aft portion of the fuselage. Considering the framing of both sides and the cross member on top and bottom, 5/32" square balsa strips will save less than 4 grams all total.

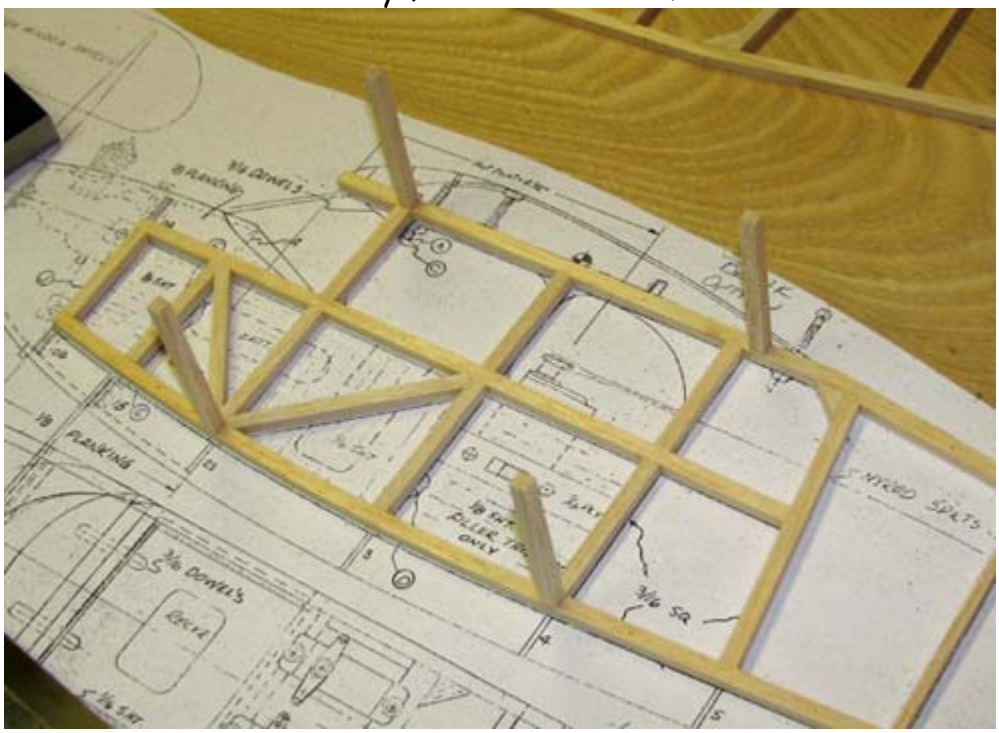
I have wasted some time and materials going through this exercise, but at least now I know. Therefore, I am going to proceed with the Cloudster construction using the two sides I have already built out of 3/16" square strips.....Tandy

David Harding

From: Tandy C. Walker [tandyw@flash.net]
Sent: Friday, October 30, 2009 6:16 PM
To: Undisclosed-Recipient: ;@smtp101.sbc.mail.mud.yahoo.com
Subject: 4 Speed 400 Cloudster - Joining the Sides

Speed 400 Cloudster Project

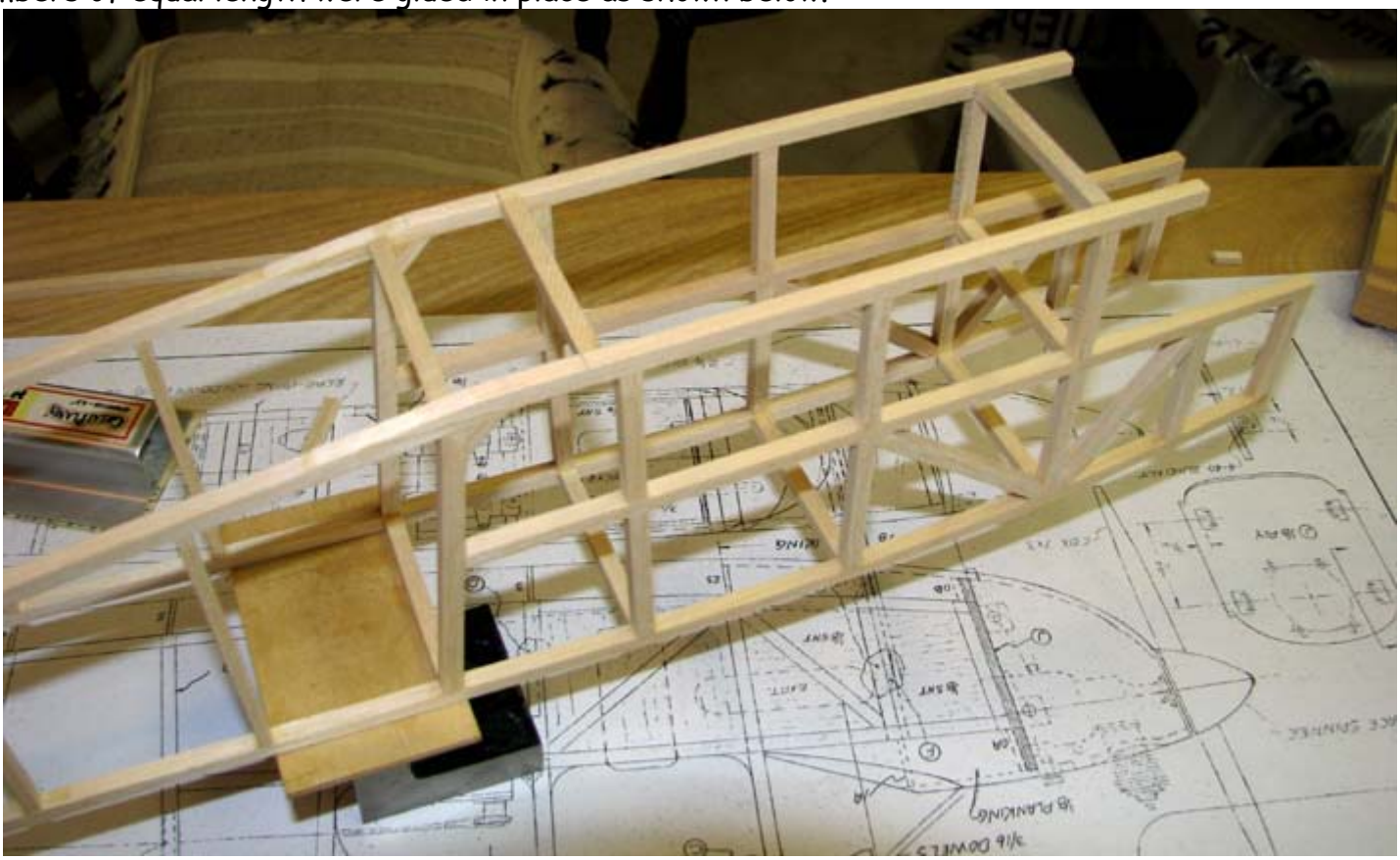
The Cloudster's fuselage width is a constant 2-9/16" from the front cabin post back to the inclined upright just behind the wing's trailing edge. Four 3/16" square cross members of equal length were cut and glued with aliphatic glue to the inside face of the right side at the proper joints as shown below. The glue was allowed to only tack dry for only about 1 minutes. It was still pliable enough to square up the cross members both longitudinally as well as vertical with a square. Once squared, these were allowed to dry for about an hour.



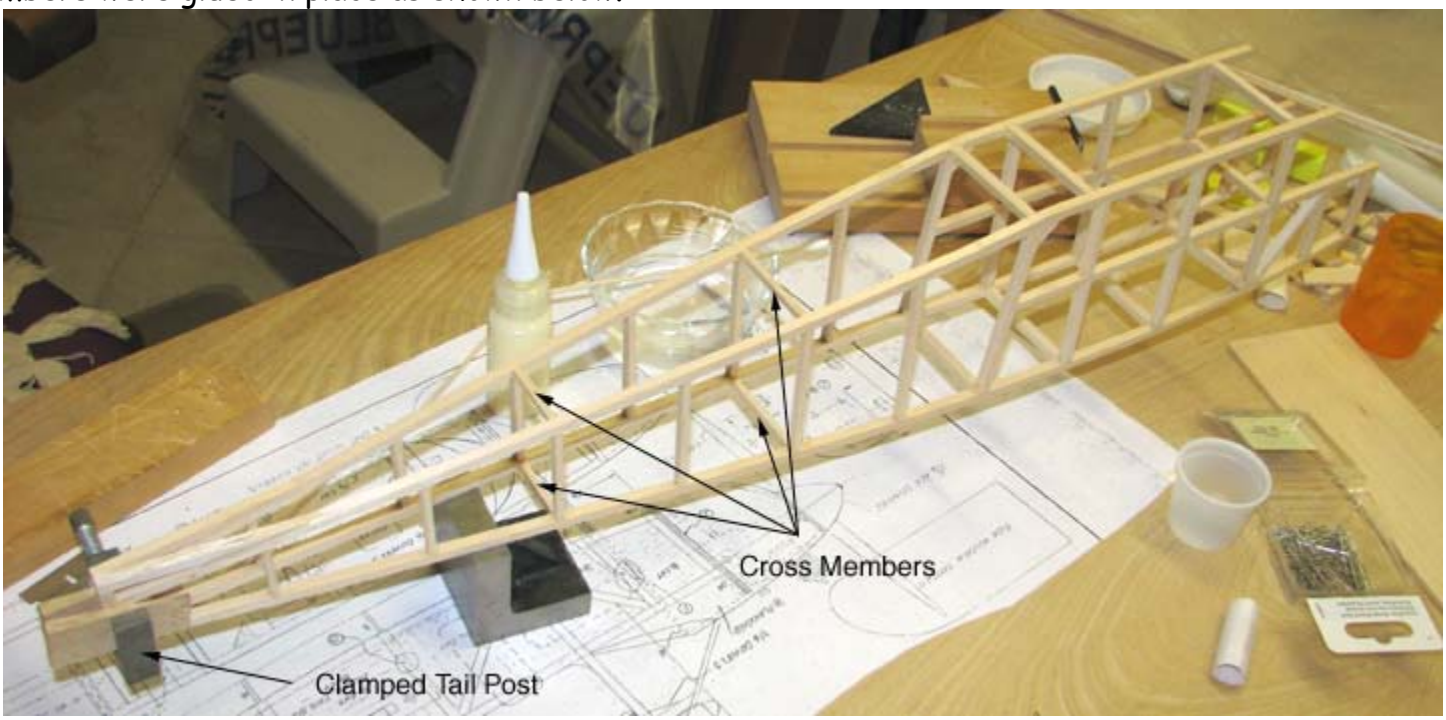
Next, aliphatic glue was applied to the ends of the four cross members and the left side was put down onto the ends of the four cross members. Here it gets a little tricky. Working pretty fast, the ends of the cross members were carefully aligned to left side joints and the excess glue wiped off with a wet Q-Tip. With the aliphatic glue just tacked, the two sides were squared up using a combination of squares and steel block squares. Two 1 X 2 boards were laid across the left side over the four cross members and a steel block square was placed on each to act as a press on the left side, which is also shown below. This jig set up was allowed to thoroughly dry for a little over three hours.

I want to call your attention to the little squeeze bottle seen in the picture above with yellow aliphatic glue in it. A modeler sent me two of these and asked me to try them. The bottle has a long slender spout on it and when the bottle squeezed, the glue come out in a small 1/6" stream or a 1/6" spherical blob. It makes controlling the glue application so easy and the white screw on cap that you see keeps the spout from clogging up. However, at the moment, I can not remember who sent them to me.

After the squares and steel block squares were removed, the remaining other four 3/16" square cross members of equal length were glued in place as shown below.



Once every thing was dry, the sides of the fuselage were pulled together at the rear and the tail post were temporarily clamped using hard balsa wedges on either side. Then two sets of 1/8" X 3/16" cross members were glued in place as shown below.



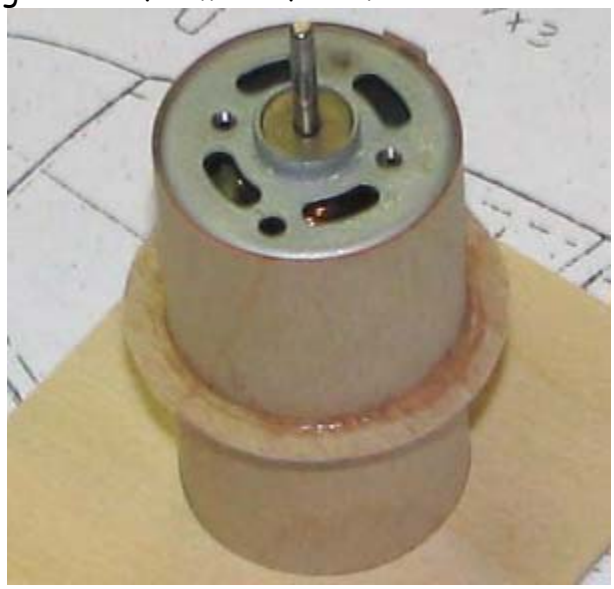
Once these are good and dry, the insides of the 3/16" tail posts will be beveled (trimmed and sanded) down to 3/32" so that when they are glued together their combined width will be 3/16". However, this will have to wait until tomorrow because I am stopping for today. I have to clean up and get ready to take my wife out to dinner this evening. :O) .....Tandy

David Harding

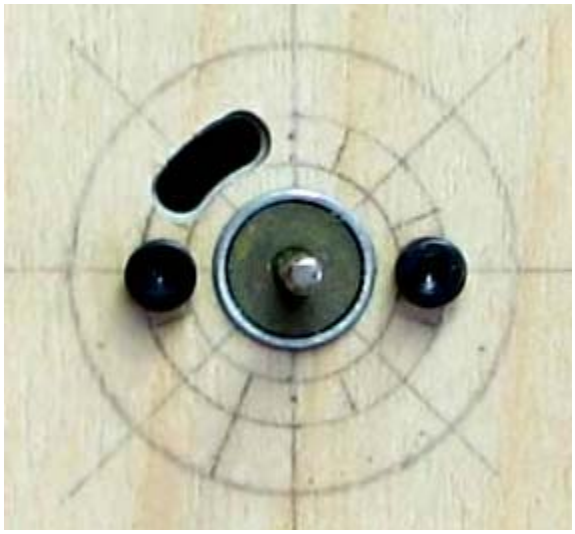
From: Tandy C. Walker [tandyw@flash.net]
Sent: Tuesday, November 03, 2009 6:00 PM
To: Undisclosed-Recipient: ;@smtp105.sbc.mail.mud.yahoo.com
Subject: 7 Speed 400 Cloudster - Speed 400 Motor Mount Design Continues

Speed 400 Cloudster Project

The picture below shows the Speed 400 motor inside the 1/64" plywood motor mounting tube. You can see the two 2.6 mm threaded holes in the front of the motor case that can be used for mounting. The plan is to make plywood disk that will slip inside this motor tube and be glued in flush with the edge of the tube. The motor will then slide in from the rear of the tube and be secured to the disk with the two mounting screws from the front.



Sue and I had a lot of stuff to do today along with her 10:30 a.m. therapy session, so I did not get started working on the motor mount until around 3:00 p.m. this afternoon. However, I did get the disk pattern laid out on a piece of 1/16" plywood. The center hole was cut out and the two holes for the 2.6 mm screws located and drilled. In addition one of the four ventilation openings was located and cut out as shown below. Working in the blind, this turns out to be a cut and fit iterative process. As you can see, I have made some progress, just not very fast! I hope to get the other three ventilation openings finished tomorrow and the disk cut out and fitted to the inside motor tube. The disk will then be glued in place in the motor tube.....Tandy

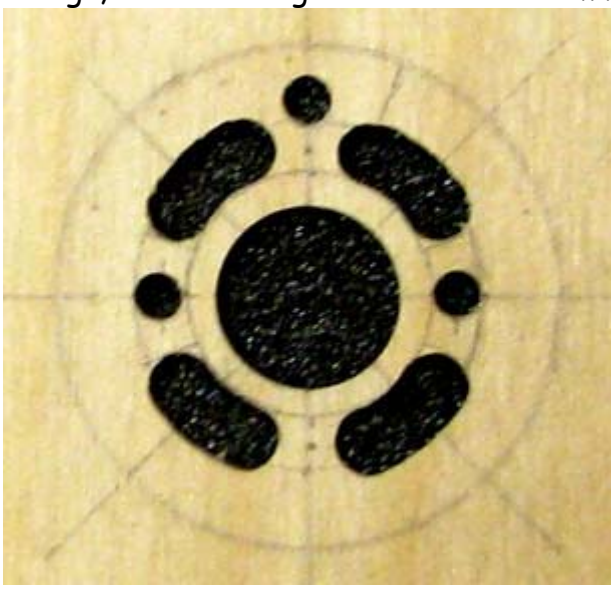


David Harding

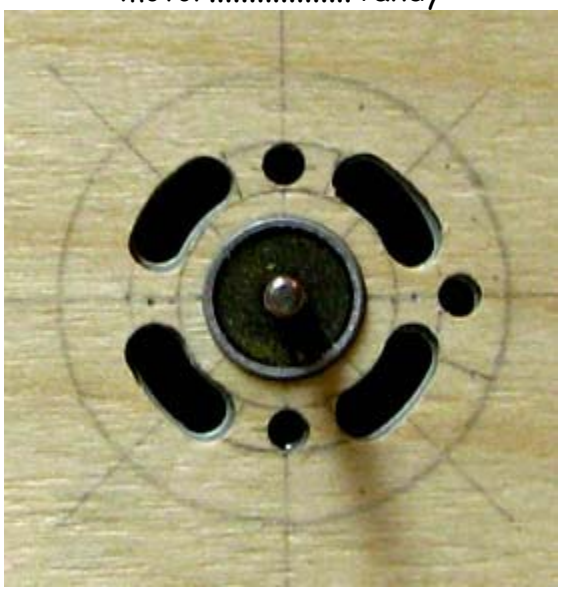
From: Tandy C. Walker [tandyw@flash.net]
Sent: Tuesday, November 03, 2009 9:21 PM
To: Undisclosed-Recipient: ;@smtp102.sbc.mail.mud.yahoo.com
Subject: 8 Speed 400 Cloudster - Speed 400 Motor Mount Design Continues

Speed 400 Cloudster Project

When I closed the Report No. 7 this afternoon, I said, "I hope to get the other three ventilation openings finished tomorrow." Well after dinner, I helped Sue get ready for bed and she decided to watch some TV. So off I went to the model room to work on the three ventilation openings. I worked for a couple of hours and finished the disk's openings, but did not get the outside trimmed as shown below.



This picture shows the disk overlaid on the front of the Speed 400 motor.....Tandy

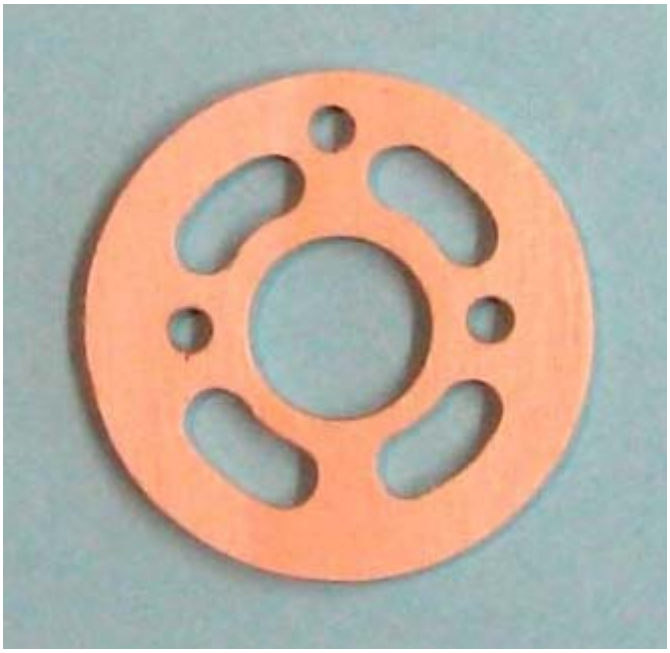


David Harding

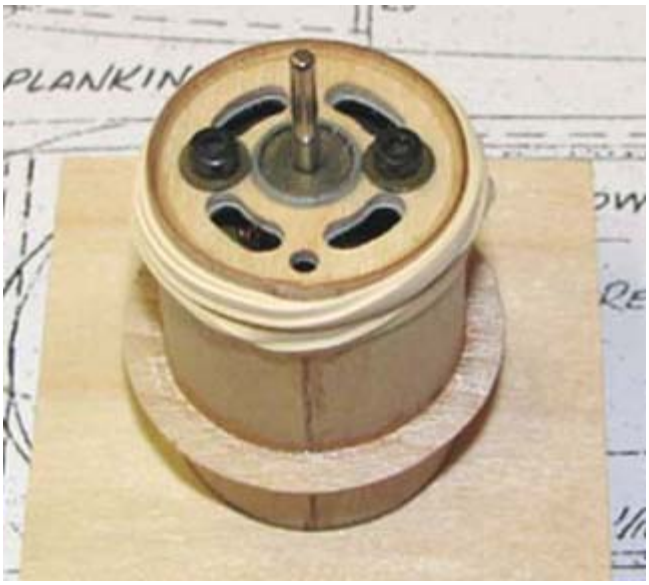
From: Tandy C. Walker [tandyw@flash.net]
Sent: Wednesday, November 04, 2009 4:12 PM
To: Undisclosed-Recipient: ;@smtp108.sbc.mail.mud.yahoo.com
Subject: 9 Speed 400 Cloudster - Speed 400 Motor Mount Design Continues

Speed 400 Cloudster Project

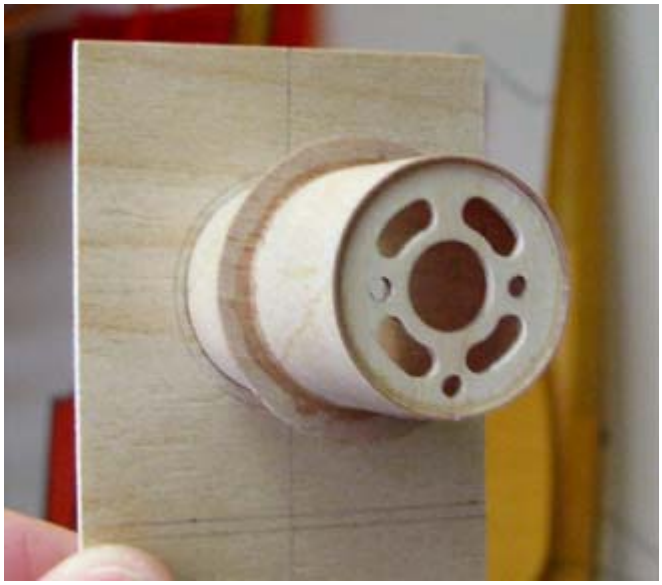
This morning, the perimeter of the disk was trimmed down and sanded to shape for a snug fit inside the front of the motor tube as shown below.



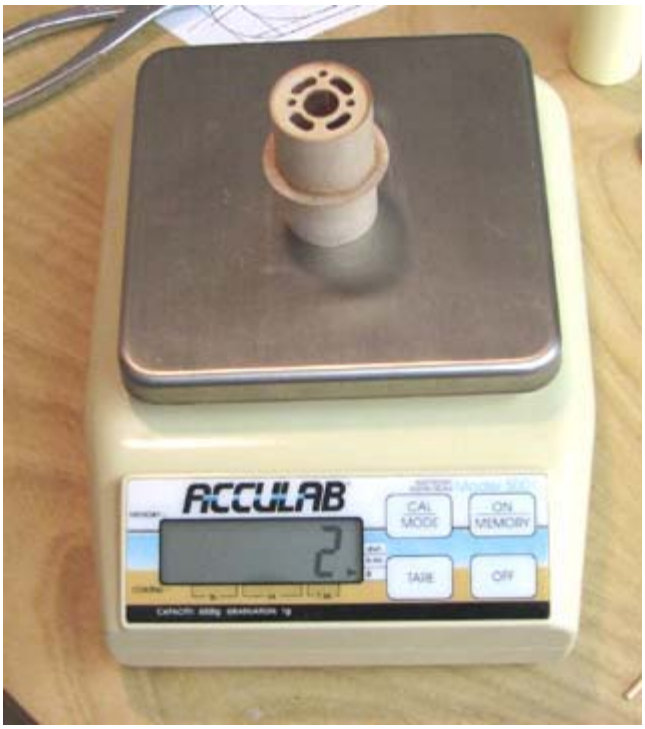
The finished disk was oriented so that the single hole lined up with the bottom seam in the motor tube as shown below and then slipped inside the front of the motor tube. The Speed 400 motor was inserted from the rear and pushed forward to contact the inside face of the disk. The motor was then rotated to align its openings with the openings in the disk and the two 2.6 mm mounting screws were screwed in. By pushing on the back of the motor, the disk was moved forward to within about a 1/16" from the front edge of the motor tube. At this point the disk was CA'd around its circumference. A rubber band was wound around the outside of the front edge of the motor tube to insure a good bond between the disk and motor tube as shown below.



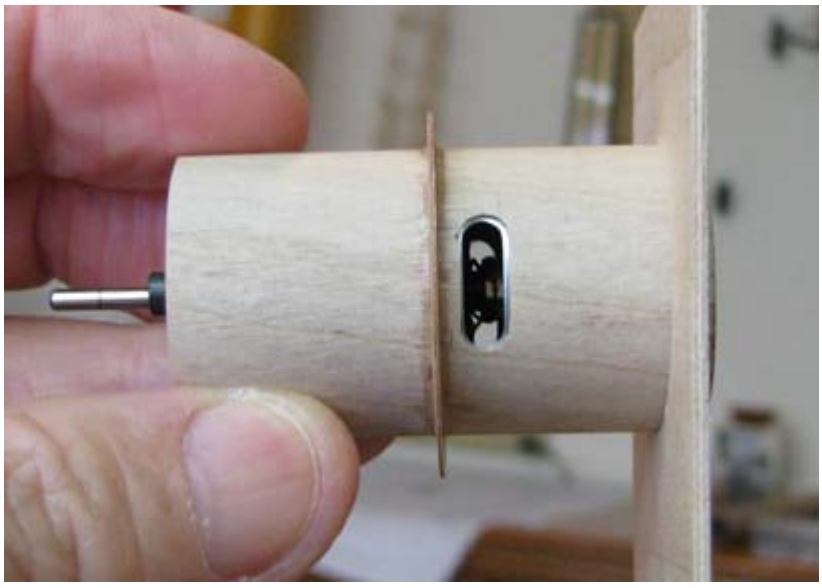
Once dry, the rubber band and motor were removed from the tube in order to take this picture for you to see.



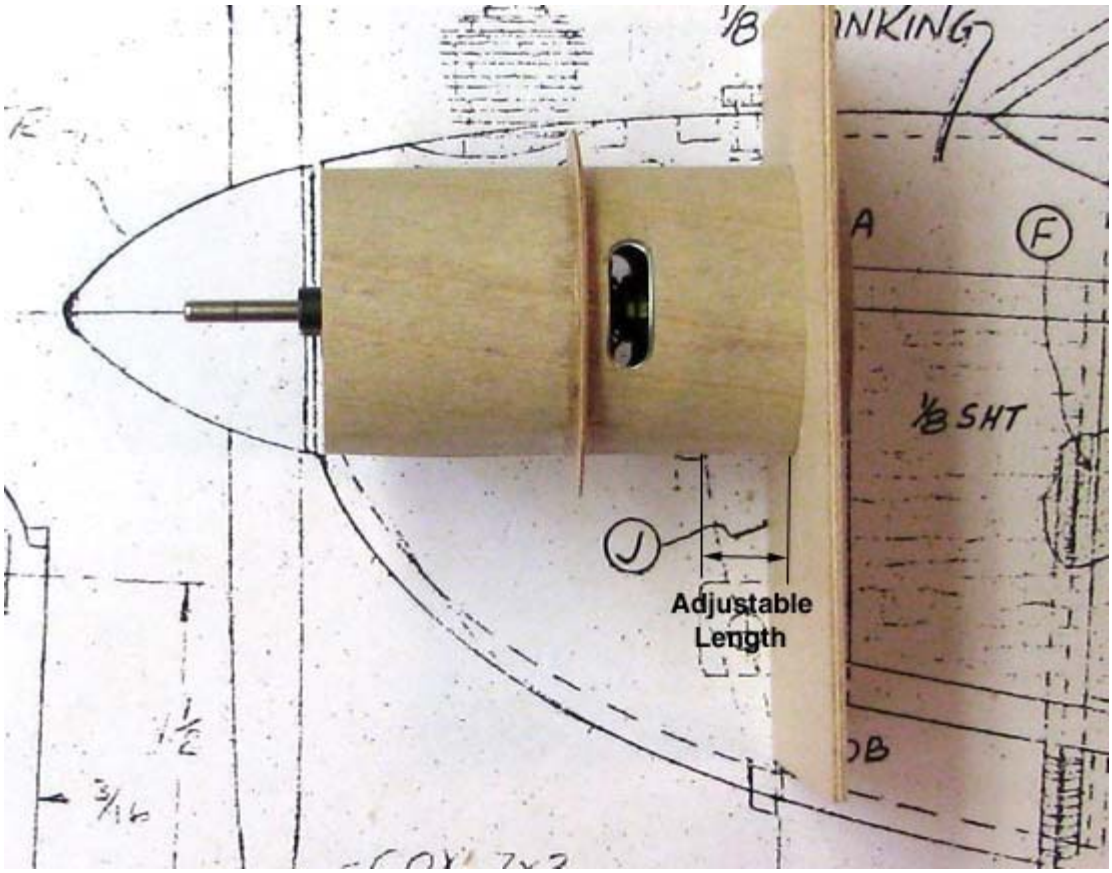
The rolled motor tube with the disk glued in the front makes this motor mount incredibly strong and it only weighs 2 grams as shown below. However, the 1/16" plywood back plate and four small gussets will probably add another 1 to 2 grams. But what the heck, I think a 4 gram motor mount represents a significant weight savings, even if it was time consuming to make.



Again, working in the blind, an iterative process of cut and fit was used to make the motor's brush ventilation slots on the side of the motor tube as shown below.



The motor mount with the Speed motor inside was placed on the Cloudster plan for a trial fit as shown below. The current unknown is how much length is going to be required to fit the 1-3/16" spinner/adapter on the motor's shaft so the rear face of the prop is in the proper place on the plan. If you look close at my notation below the motor tube, you will see there is a fair amount of adjustable length to accomplish this.



So at this point I have to stop work on the motor mount until I receive the 1-3/16" spinner/adapter from Hobby Lobby in about two weeks. Then I can trim up and finish the motor mount's 1/16" plywood back plate and glue it in place. This back plate is what will bolt to firewall. I plan to add four small gussets in a cruciform configuration between the motor tube and the back plate for additional motor tube support. So I guess I will turn my efforts now to building on the stab and rudder.

Speaking of Hobby Lobby, I contacted Jay Burkhart ***(a electric modeler and Hobby Lobby technical consultant)*** this morning to assist me in getting yesterday's order corrected for the right LiPo battery packs. I received the updated corrected confirmation from Hobby Lobby this afternoon.

Item Description: PL2 1350mAh 2S 7.4V
Item Number: TP13502SPL2
Quantity Ordered: 2

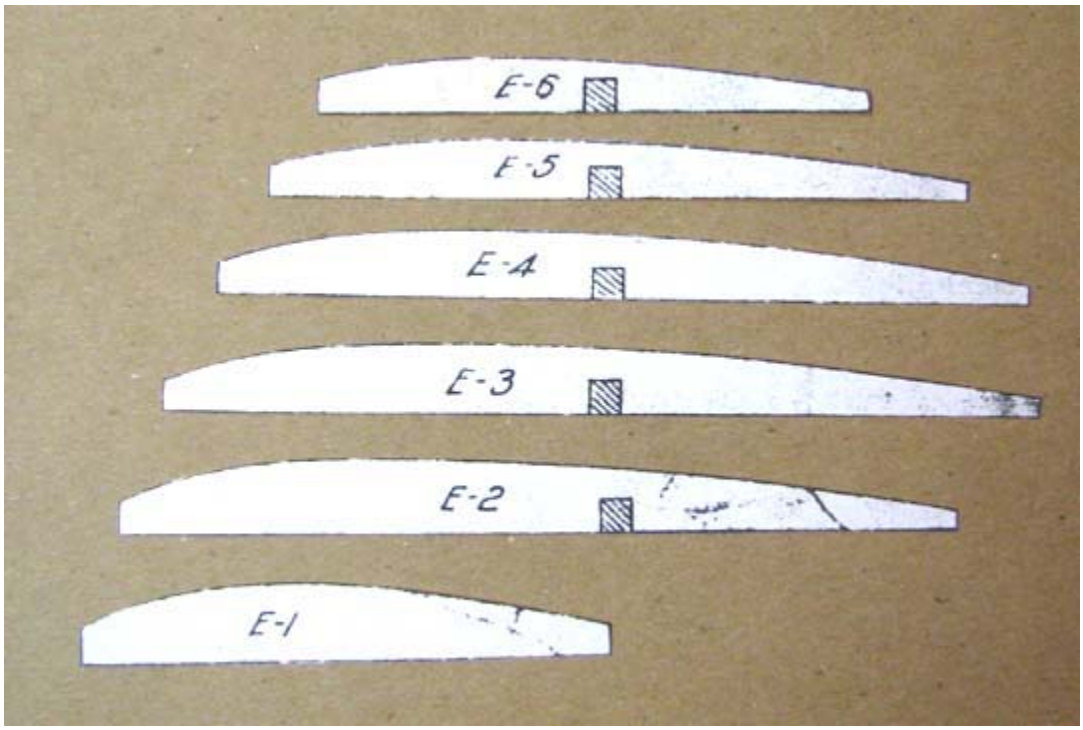
Thank you for your help and support in this matter Jay!.....Tandy

David Harding

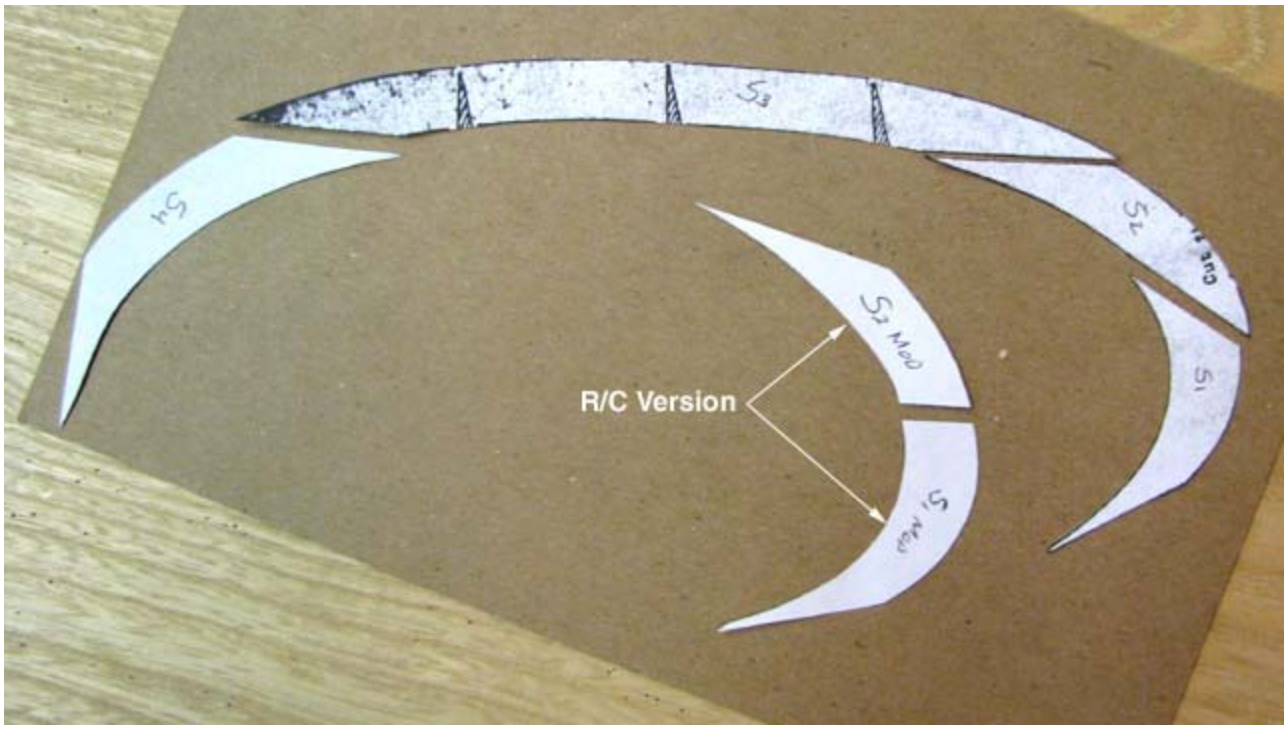
From: Tandy C. Walker [tandyw@flash.net]
Sent: Thursday, November 05, 2009 10:42 PM
To: Undisclosed-Recipient: ;@smtp104.sbc.mail.mud.yahoo.com
Subject: 10 Speed 400 Cloudster - Stab Patterns

Speed 400 Cloudster Project

The Jim Adams plan of the Cloudster does not show the stab ribs as does the Cleveland plan so I went to the copy center today and had a copy of the Cleveland plan made reduced by the 0.923 scale factor. This provided the stab rib patterns, which I cut out as shown below.



Since I had the reduced copy anyway, I also cut out the stab's tip and trailing edge patterns (S1 through S4) as shown below. Then I realized that I goofed on parts S1 and S2 as they were not for R/C with the stab and elevator division. So I cut out as second set of S1 and S2 modified from the other side of the plan, which does show the R/C division. Not a lot of progress today I know, but some. The key to model building is to something every day.....Tandy

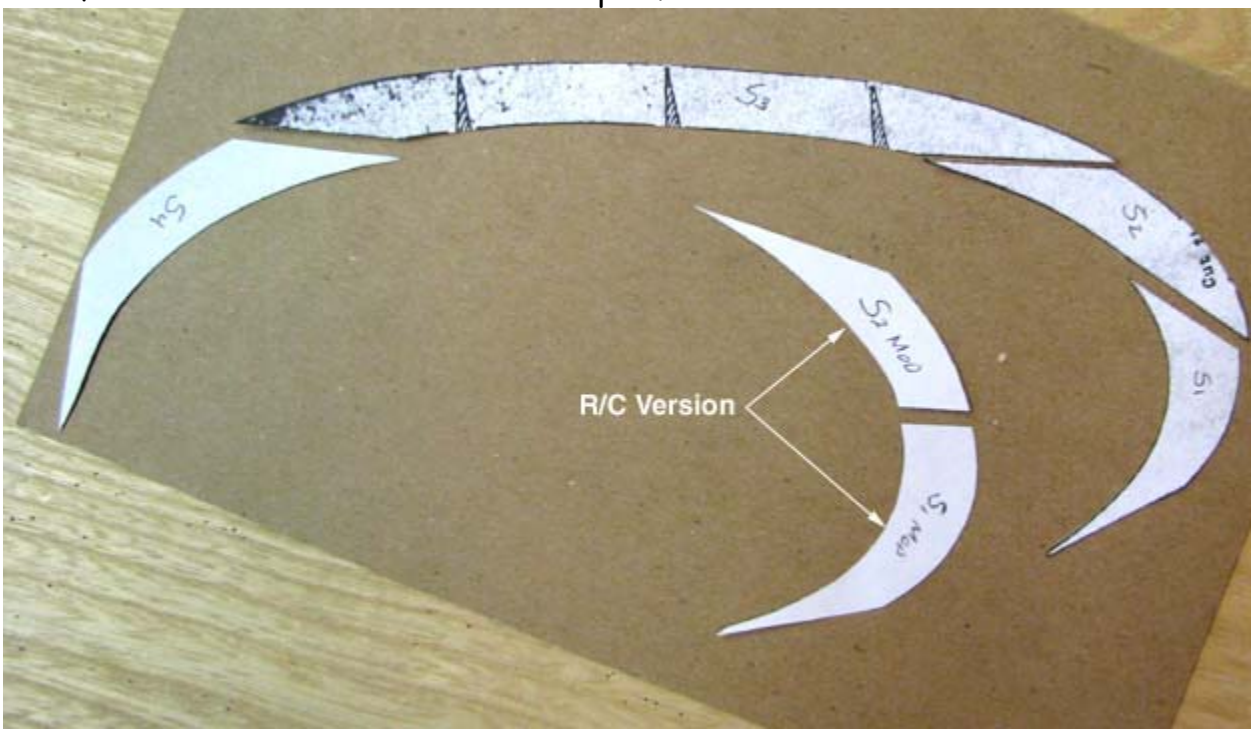

S3
S4
S2
S2 Mod
S1
S1 Mod
R/C Version

David Harding

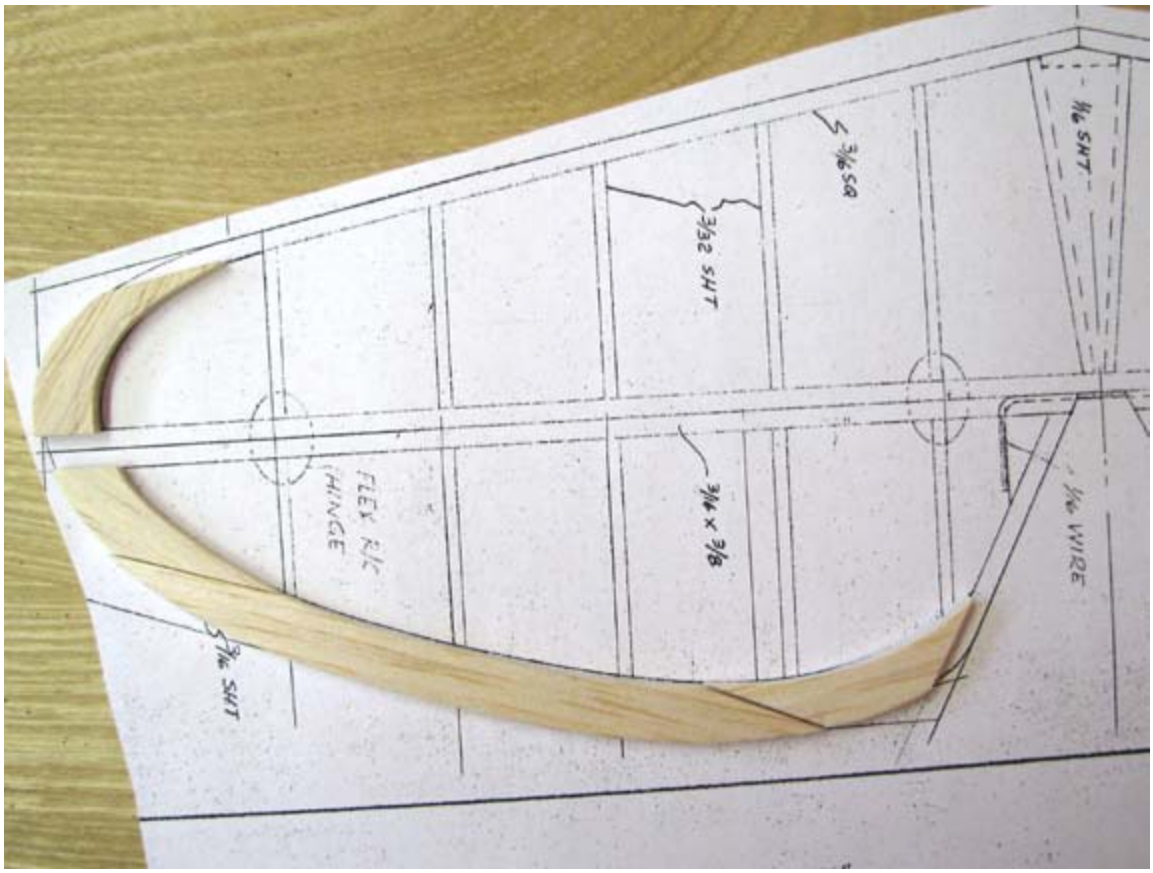
From: Tandy C. Walker [tandyw@flash.net]
Sent: Friday, November 06, 2009 11:51 PM
To: Undisclosed-Recipient: ;@smtp103.sbc.mail.mud.yahoo.com
Subject: 11 Speed 400 Cloudster - Starting Stab Construction

Speed 400 Cloudster Project

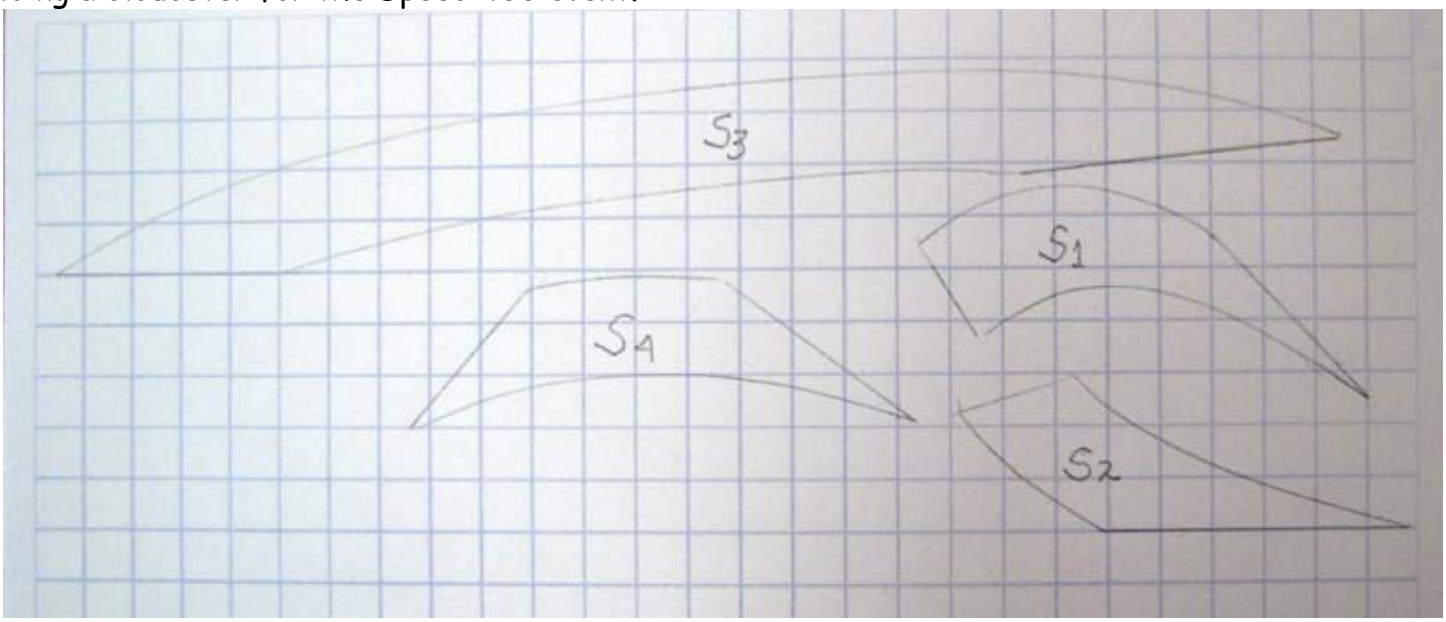
In my last report, I showed these Stab tip and trailing edge pattern that were cut out of the reduced Cleveland Cloudster plan.



Well, as it turned out there was a fair amount of modification required to fit the Jim Adams plan. I used the patterns and cut the parts oversize. Then after a considerable amount trim, sand and fit on each oversize part, I finally got them to fit the Jim Adams plan as shown below.



I took each of the four parts and traced them out on a quadrille sheet to make correct patterns as shown below. Tomorrow I will mail these patterns to James Lollar up in Ada, Oklahoma as he is also building a Cloudster for the Speed 400 event.



Then I made matching parts for the other side of the stab as shown below.

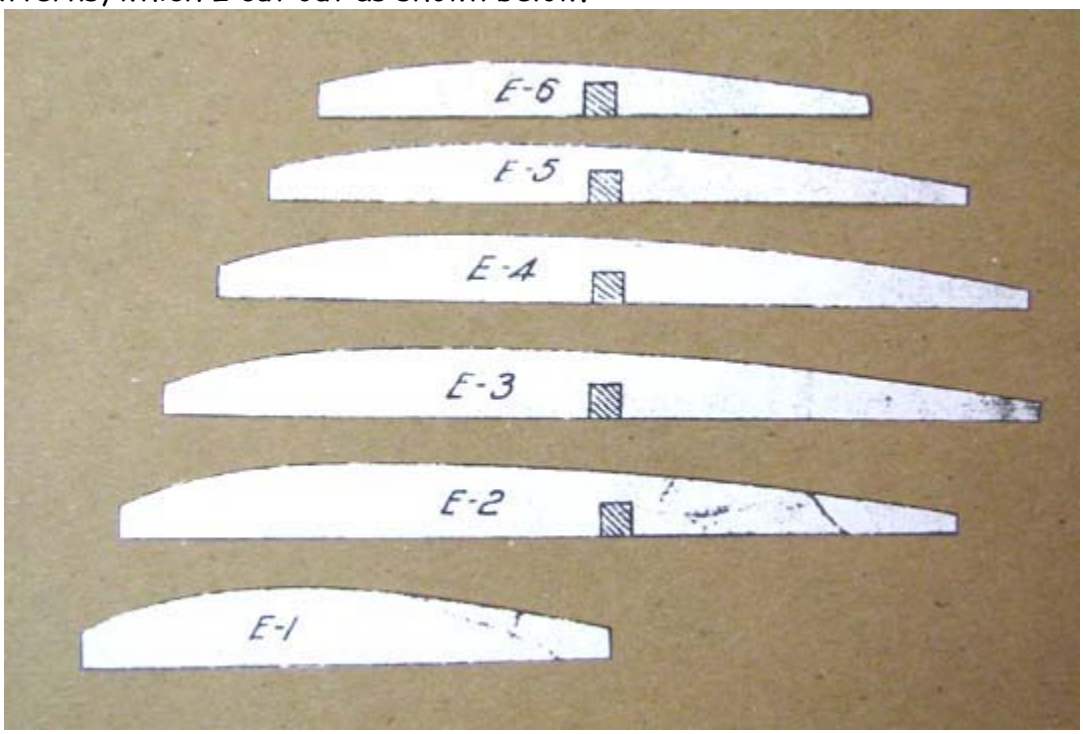
Tomorrow, I will cut out the stab ribs and start laying out the stab structure. However, tomorrow afternoon Sue and I are going to see the new Amelia Earhart movie so I may not get too much done.....Tandy

David Harding

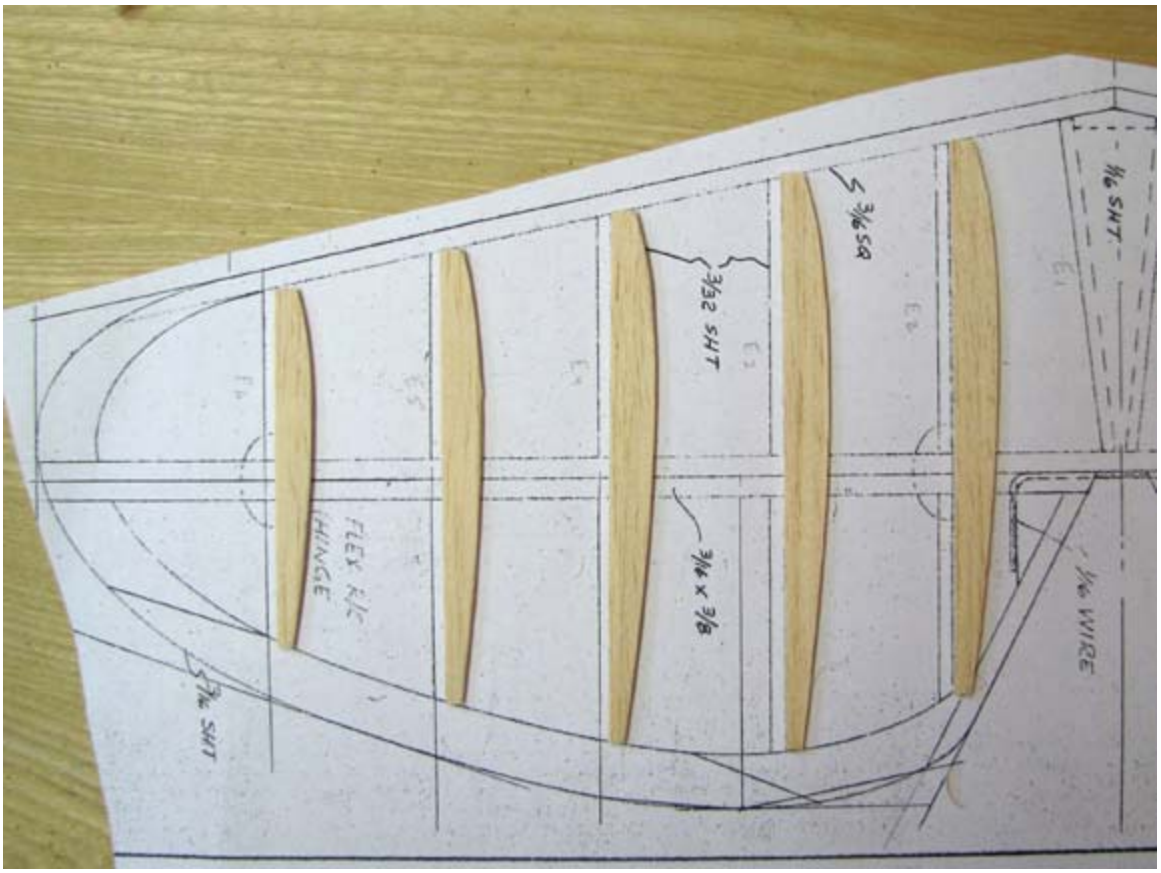
From: Tandy C. Walker [tandyw@flash.net]
Sent: Tuesday, November 10, 2009 11:20 PM
To: Undisclosed-Recipient: ;@smtp105.sbc.mail.mud.yahoo.com
Subject: 12 Speed 400 Cloudster - Construction of the Stab

Speed 400 Cloudster Project

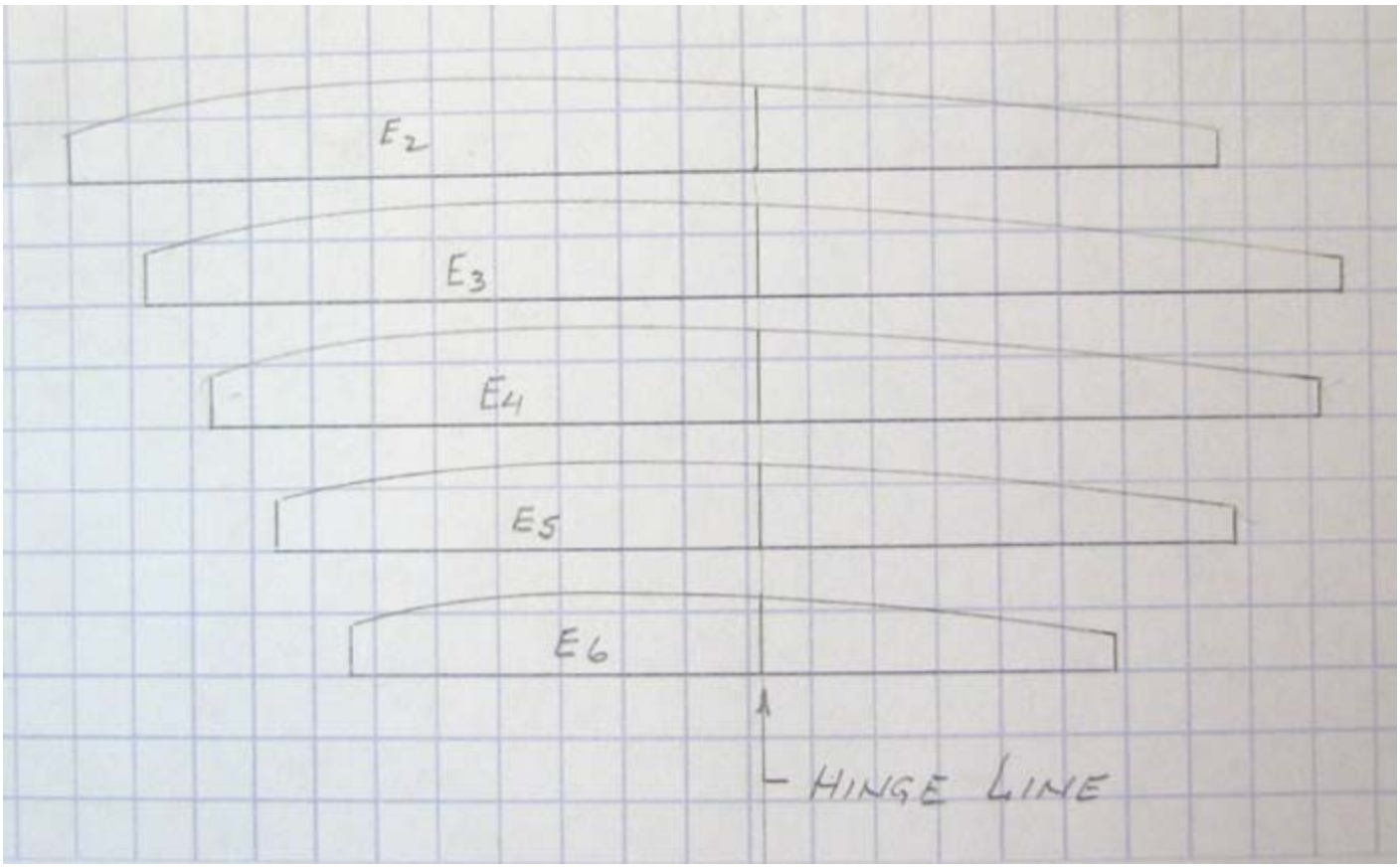
As I reported previously, the Jim Adams plan of the Cloudster does not show the stab ribs as does the Cleveland plan so I went to the copy center and had a copy of the Cleveland plan made reduced by the 0.923 scale factor. This provided the stab rib patterns, which I cut out as shown below.



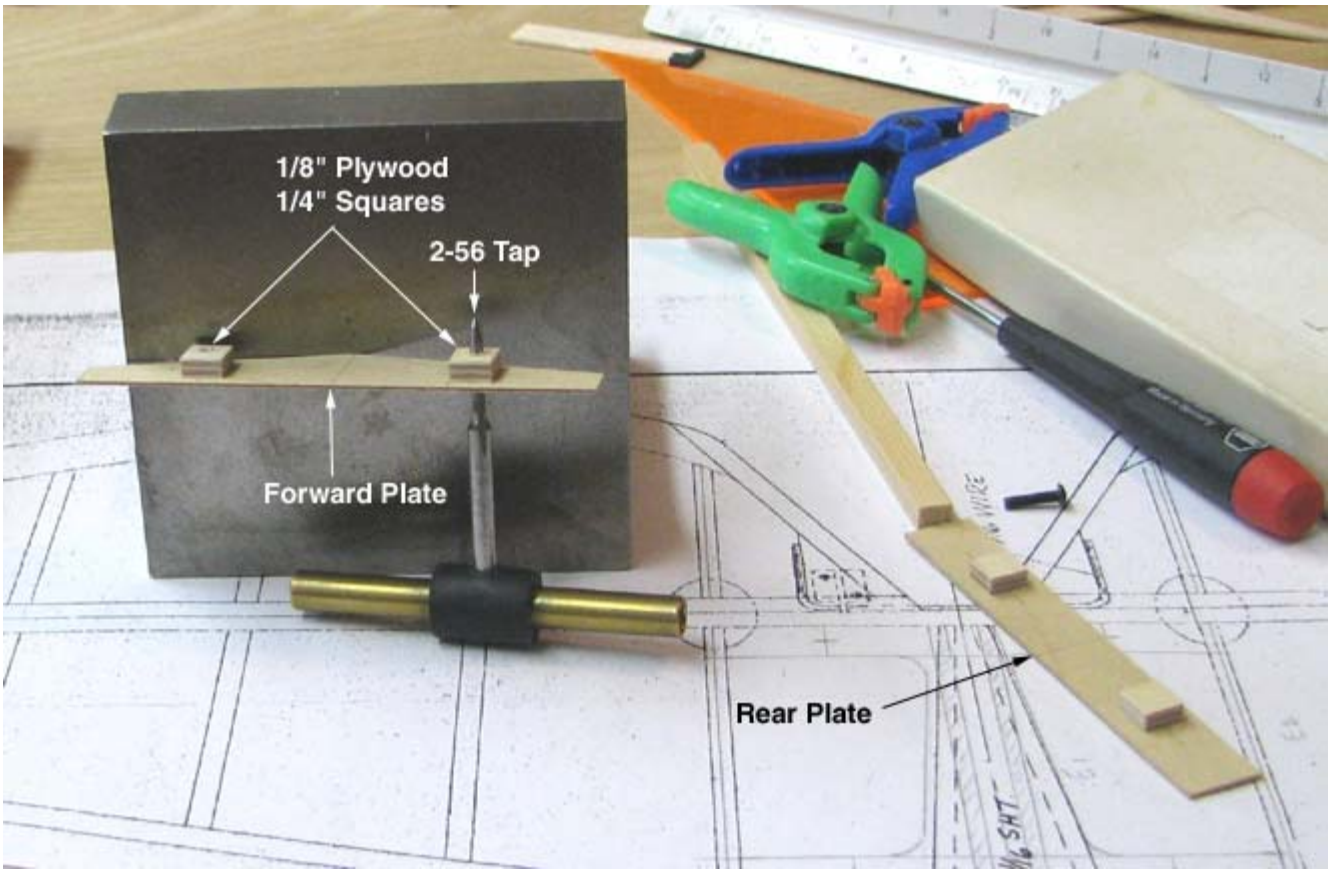
However, these patterns leave a little bit to be desired in their fit. So I used them as a guide to cut out stab ribs that actually fit properly. I made the height of each rib's LE 3/16" so it would butt into the LE full height. I also made the height of each rib's TE 1/8" because the 3/16" TE pieces must be trimmed down to 1/8". The resulting 1/16" rib parts are shown below.



Then the ribs (E2, E3, E4, E5, and E6) were traced onto a sheet of quadrille paper to come up with the correct rib patterns as shown below.

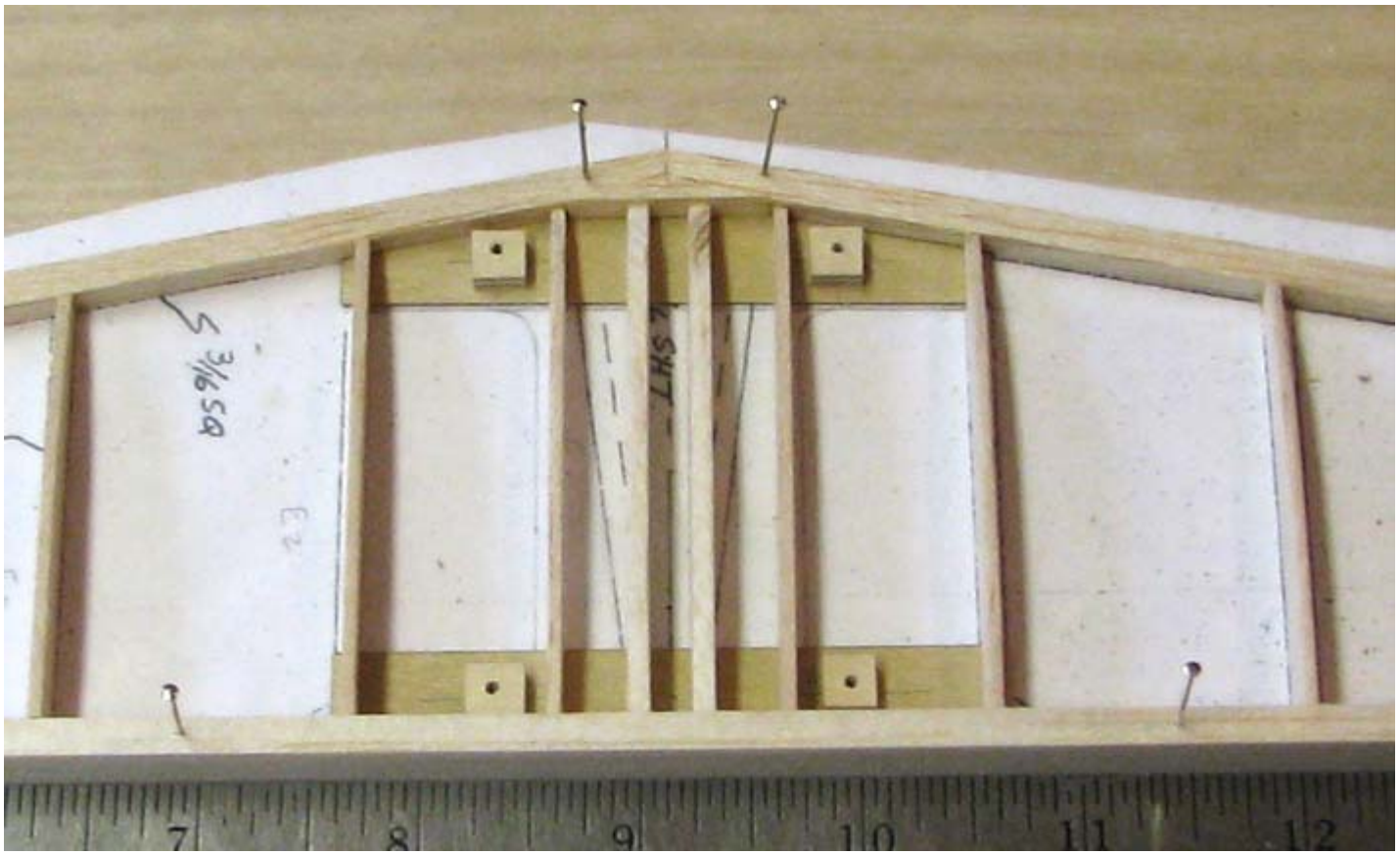


The center section of the stab is being modified in order make the stab removable from the fuselage. This is accomplished with two 1/32" plywood stab plates shown below. As you can see, two 1/8" plywood squares are glued to the stab plates and threaded with a 2-56 tap.



The lay up of the stab structure is shown below. Notice how the two stab 1/32" plywood plates are integrated into the center section on the bottom of the stab.

This is a close up of the stab center section and there are two things to observe: (1) the wedge doubler that reinforces the leading edge joint and (2) the two 3/32" ribs that form the 3/16" slot on the stab's center line for the vertical tail's removable fin. The top and bottom of the center section will be planked with 1/32" sheet balsa a little later.....Tandy

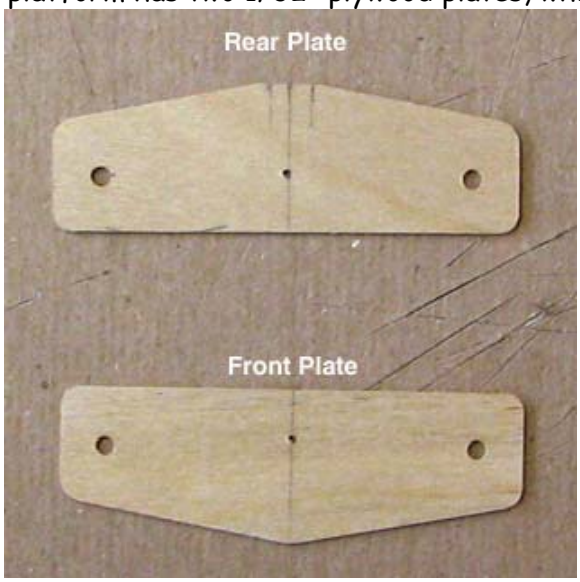

3/4 SQ
7
8
9
10
11
12

David Harding

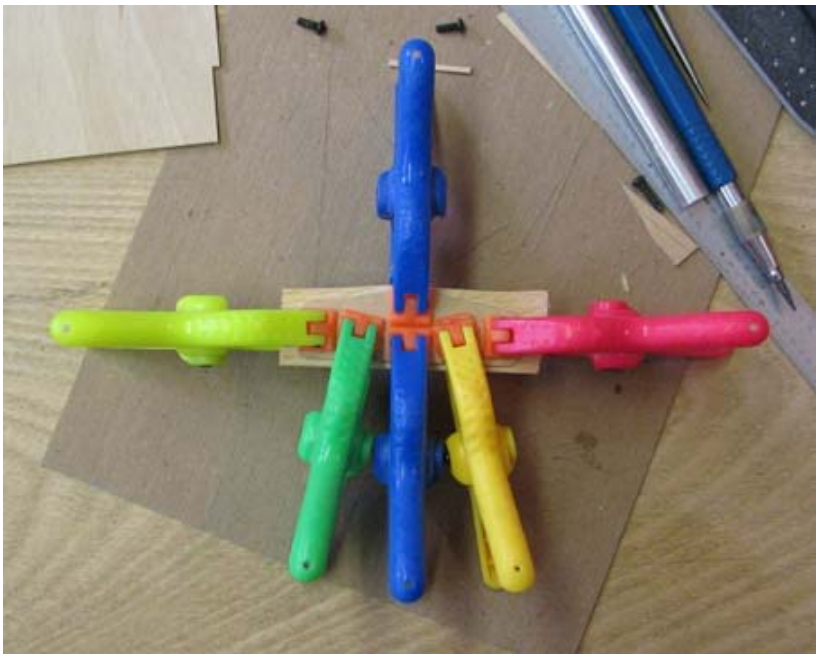
From: Tandy Walker [tandyw@flash.net]
Sent: Sunday, November 15, 2009 3:57 PM
To: Undisclosed-Recipient: ;@smtp102.sbc.mail.mud.yahoo.com
Subject: 15 Speed 400 Cloudster - Construction of the Fuselage Stab Platform

Speed 400 Cloudster Project

The fuselage's stab platform has two 1/32" plywood plates, which are shown below.

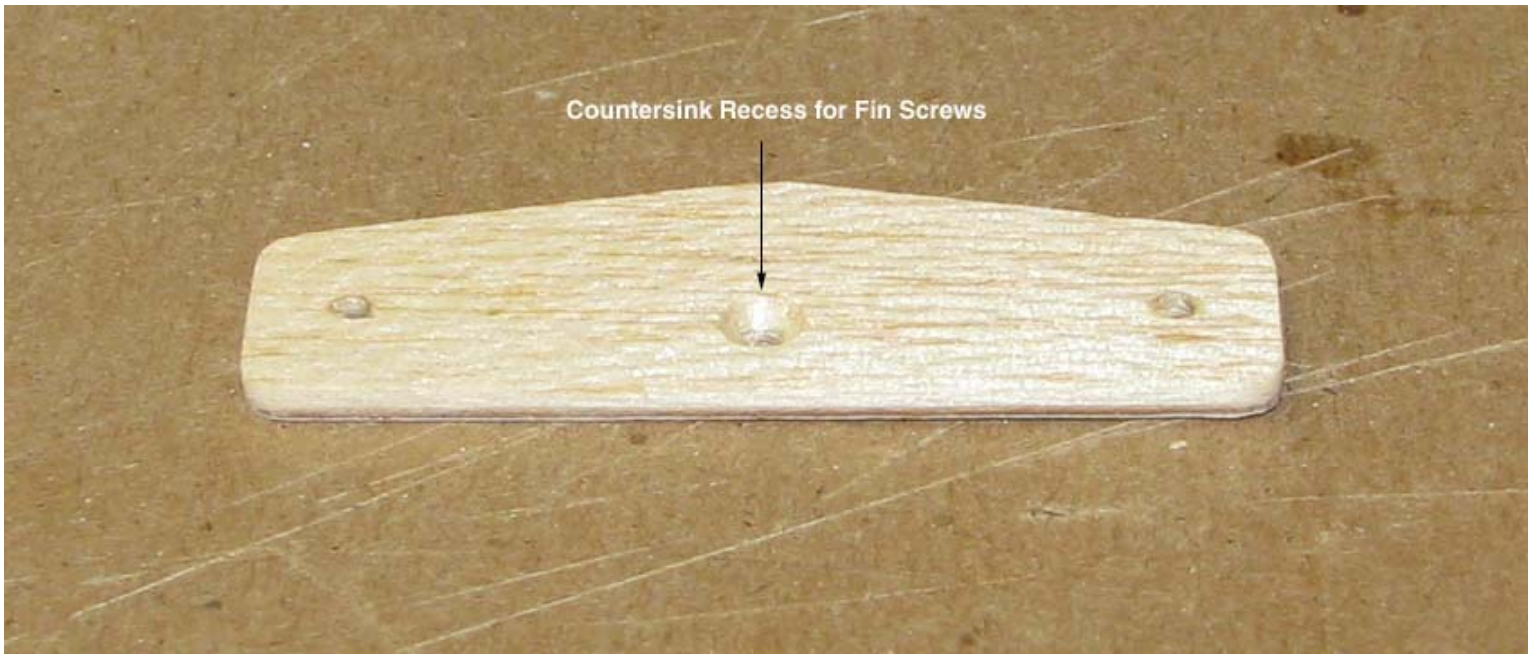


1/32" balsa sheet is laminated onto the upper side of these plywood plates as shown below. This is to provide stiffness to the 1/32" plywood and save a little weight.

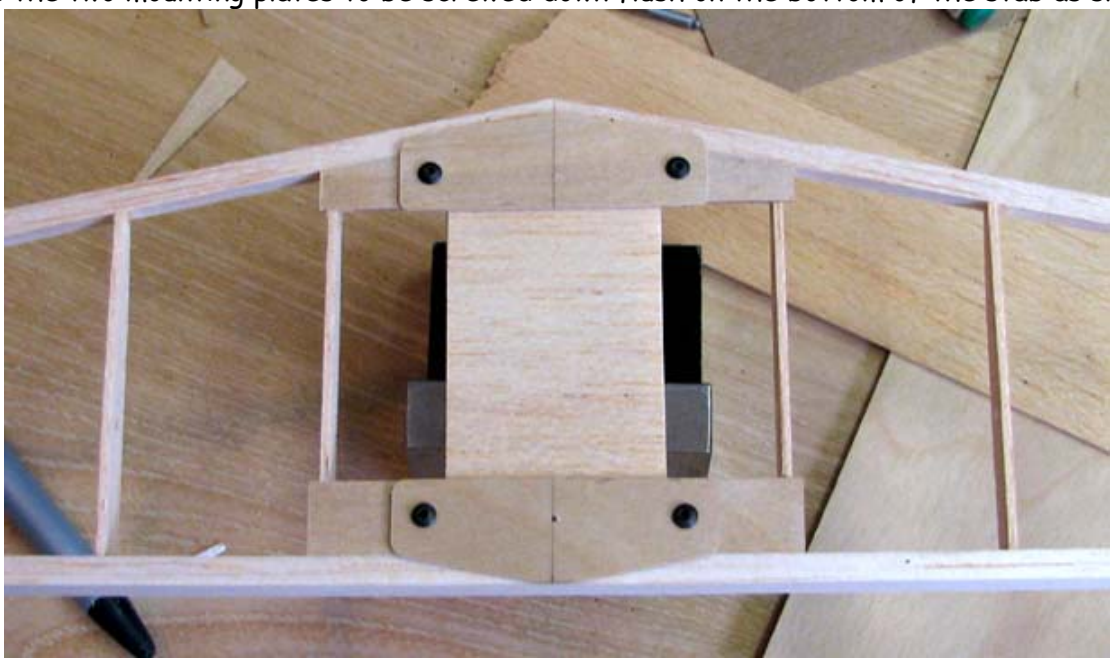


A countersink recess is drilled into the 1/32" balsa lamination as shown below to receive the heads on the 2-56 cap screws that secures the fin in the stab slot

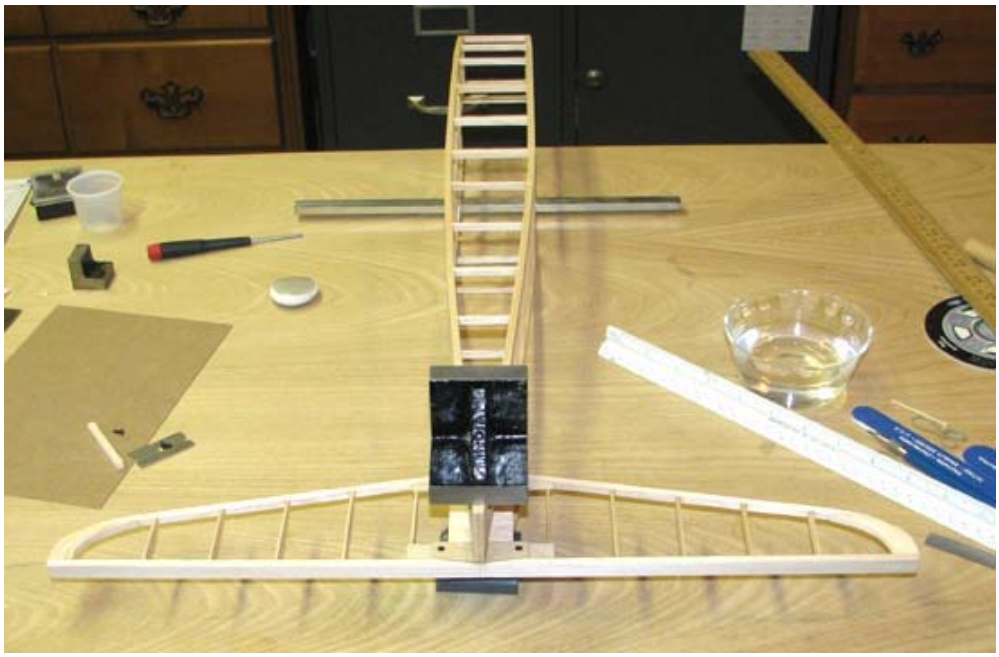
from the bottom.



This then allows the two mounting plates to be screwed down flush on the bottom of the stab as shown below.

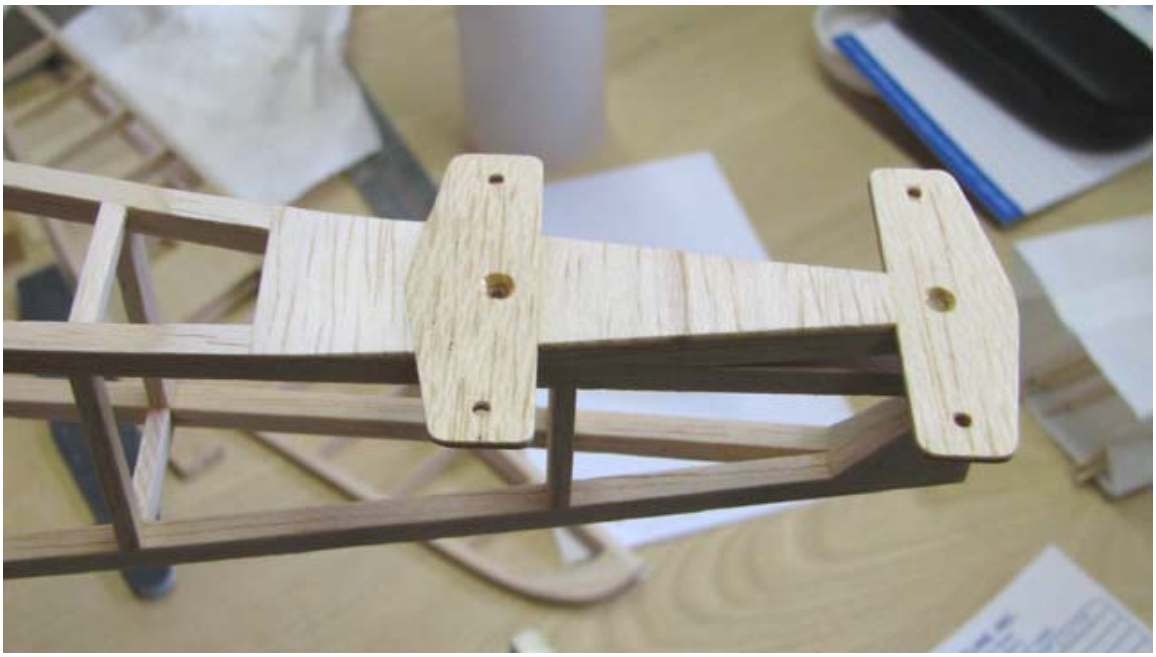


With the two mounting plates screwed to the bottom of the stab, the stab and fuselage were jigged up and the two mounting plates glued on the fuselage top longerons.



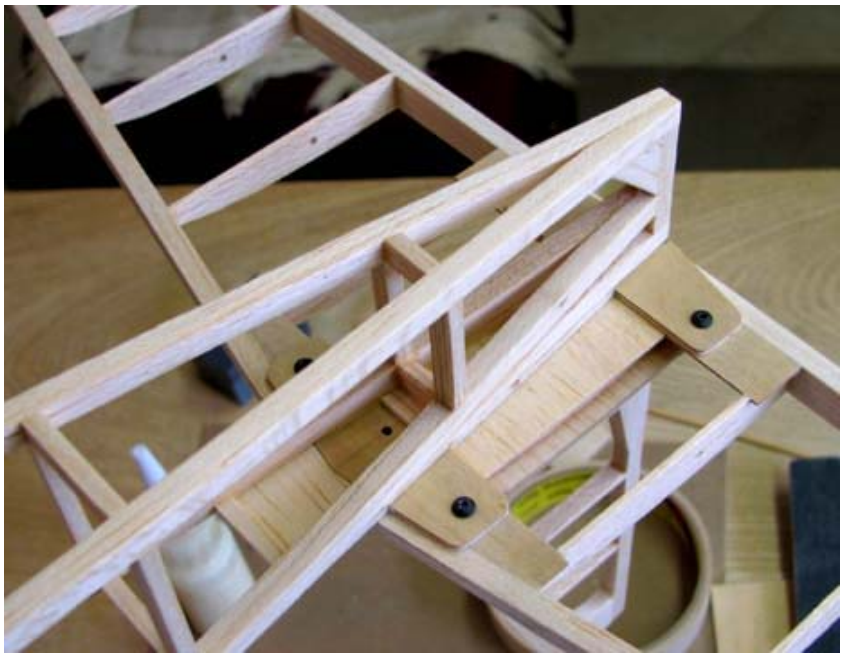
Once the glued dried, the screws were removed and the stab taken off, leaving the two mounting plates perfectly aligned and glued in place as shown below.

The stab platform was then finished out with 1/16" balsa sheet in between the two stab plates and forward of the front stab plate as shown below. The two countersink recesses and the four mounting holes were hardened with CA to prevent wear.

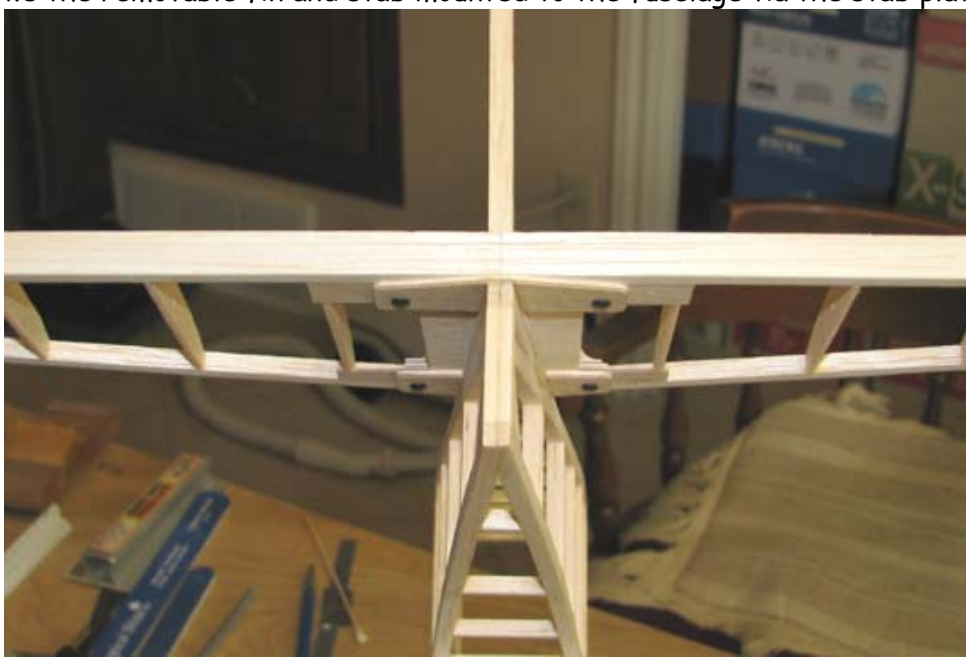


The fin was inserted into the stab slot and secured with the two 2-56 cap screws from the bottom of the stab. Then a trial fit was made by attaching the stab to the fuselage's stab platform with the four 2-56 cap screws as shown below.

This is a good shot from the bottom showing the stab mounting plates screwed to the fuselage.



This final picture shows the removable fin and stab mounted to the fuselage via the stab platform.



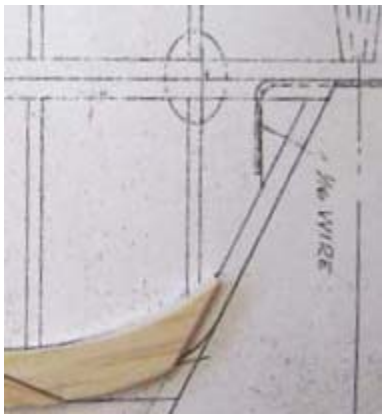
Well, work will cease for the day now as the Cowboy game will be coming on soon. The repair of my prescription glasses will require a minimum of five days (all next week). However, I will try to build the elevators and rudder if I can find some cheap reading glasses that will permit me to see the work.....Tandy

David Harding

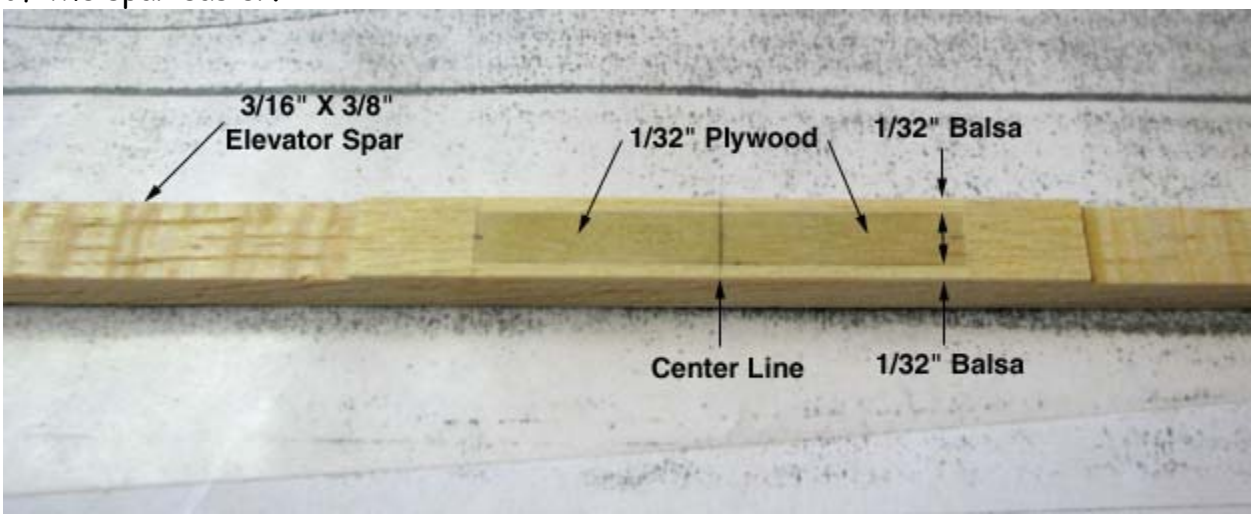
From: Tandy Walker [tandyw@flash.net]
Sent: Tuesday, November 17, 2009 3:08 PM
To: Undisclosed-Recipient: ;@smtp102.sbc.mail.mud.yahoo.com
Subject: 16 Speed 400 Cloudster - Construction of the Elevator and Rudder

Speed 400 Cloudster Project

The plans call for a 1/16" wire to connect the two halves of the elevator together as shown below.

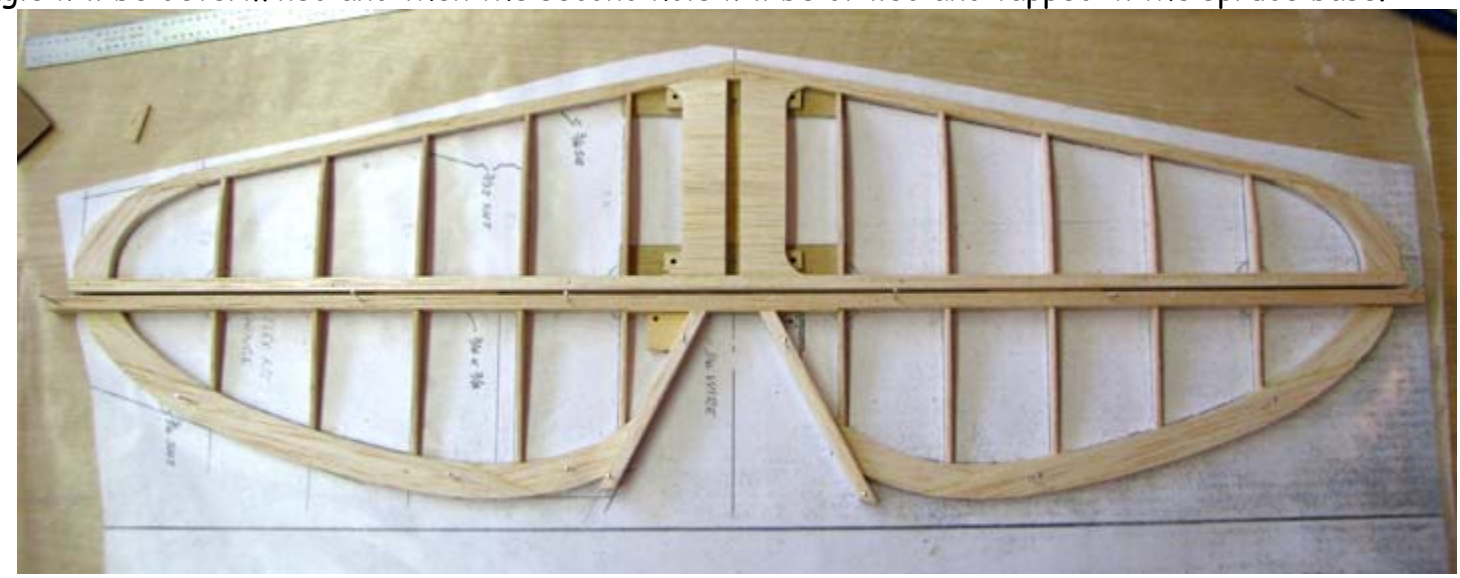


I decided to make a continuous elevator spar to eliminate the 1/16" wire. To reinforce the spar at the center, a 1/32" plywood doubler was glued to the back side as shown below. Notice that 1/32" balsa strips 1/16" wide were added to either side of the plywood double. This will make sanding a radius on the back side of the spar easier.

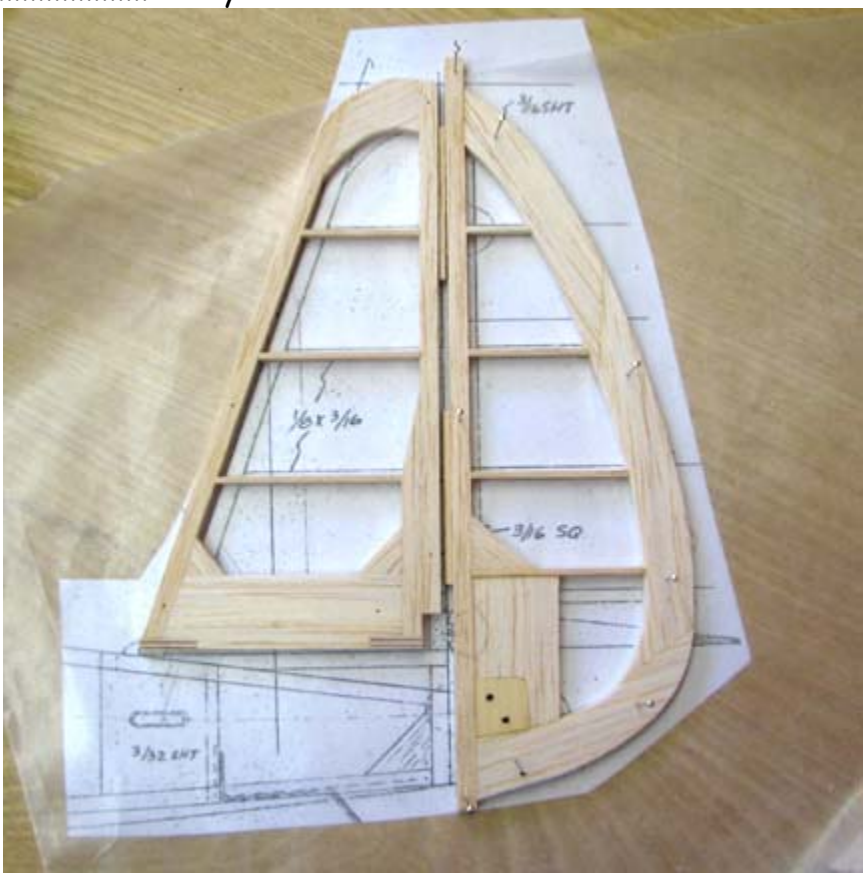


The lay up of the Cloudster's elevator is shown below. Since small removable nylon hinges are going to be used, notice the 1/16" gap between the stab spar and elevator spar to account for the hinge. If you look at the spruce base for the elevator control horn, you will notice only one 2-56 hole drilled and tapped. During the installation of the elevator push rod, the alignment angle of the control horn

angle will be determined and then the second hole will be drilled and tapped in the spruce base.



The lay up of the Cloudster's rudder is shown below. Again notice that a 1/16" gap between the fin post and the rudder post has been left to account for the hinge thickness. Also notice in the picture the large balsa reinforcement insert in the lower part of the rudder that fits around the spruce base for the control horn. If you look close, you can see my sketch of the cut out for a carry through elevator spar.....Tandy

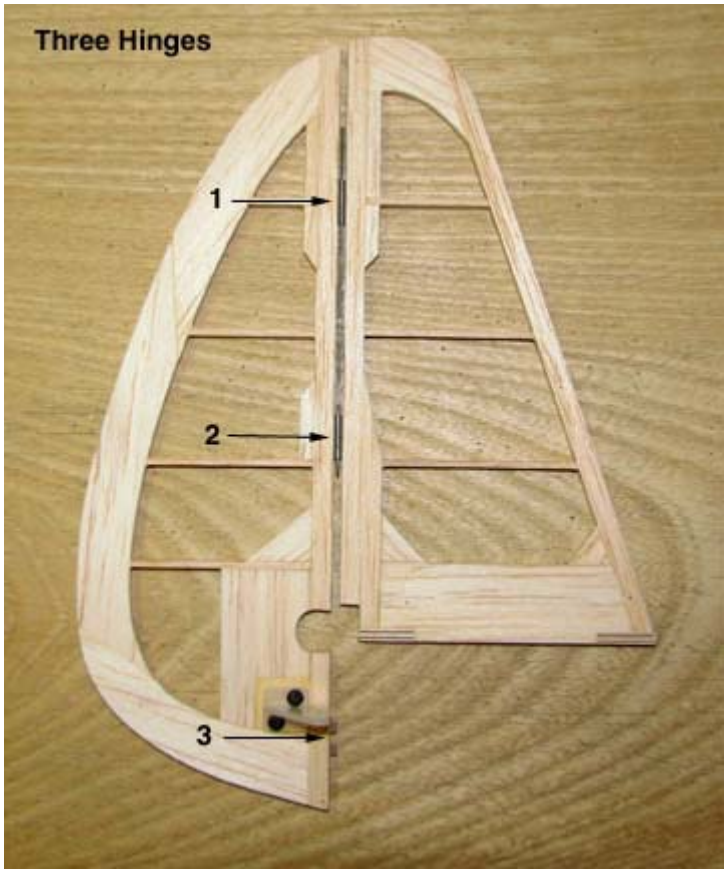


David Harding

From: Tandy Walker [tandyw@flash.net]
Sent: Thursday, November 19, 2009 12:55 PM
To: Undisclosed-Recipient: ;@smtp107.sbc.mail.mud.yahoo.com
Subject: 17 Speed 400 Cloudster - Hinging the Rudder and the Elevator

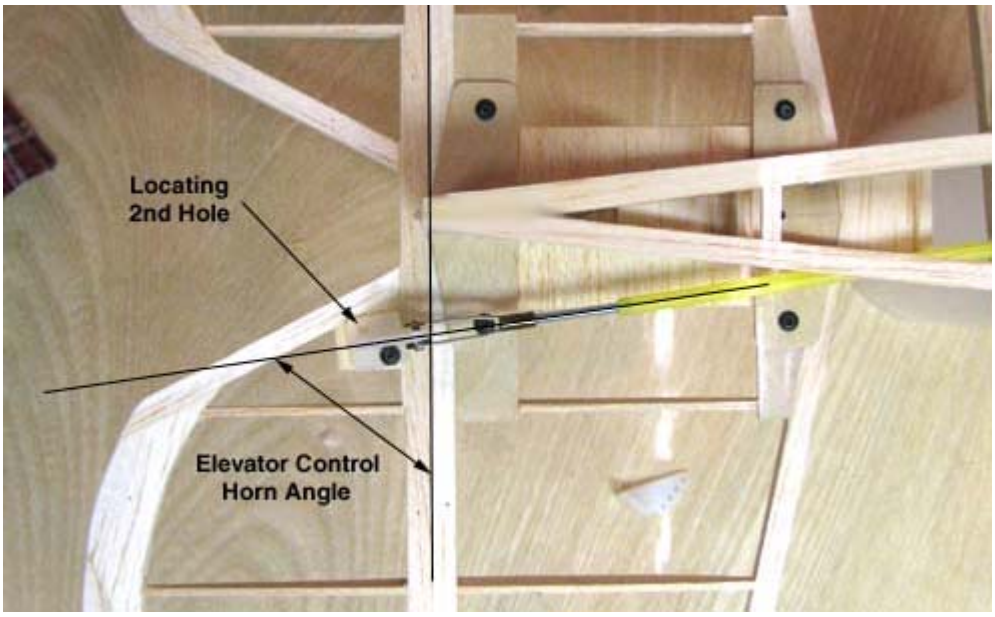
Speed 400 Cloudster Project

First order of business was to hinge the rudder as shown below. As you can see, three of the small Du-Bro nylon hinges were used, two up on the fin, and one down on the bottom of the rudder to attach to the fuselage's tail post. Back up pieces were glued to the inside of the spars where the hinge halves go through to reinforce the slot and isolate the interior of the surfaces from the hinge slot openings. Notice that the cut out for the elevator spar carry through is not large enough yet, but it will be finalized after the elevator is hinged. Notice the rudder's control horn is also installed.

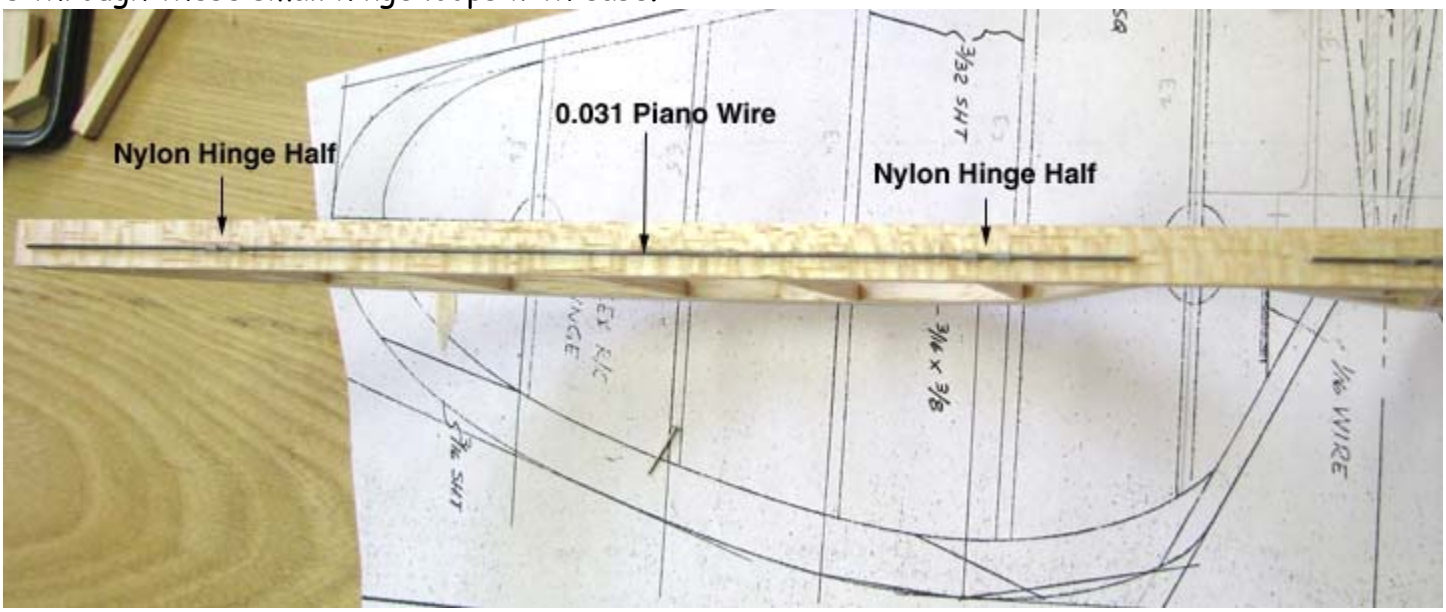


This picture shows the rudder/stab mounted to the stab platform on the fuselage. The bottom of the rudder was intentionally left wide so it could be trimmed off to match the bottom of the fuselage.

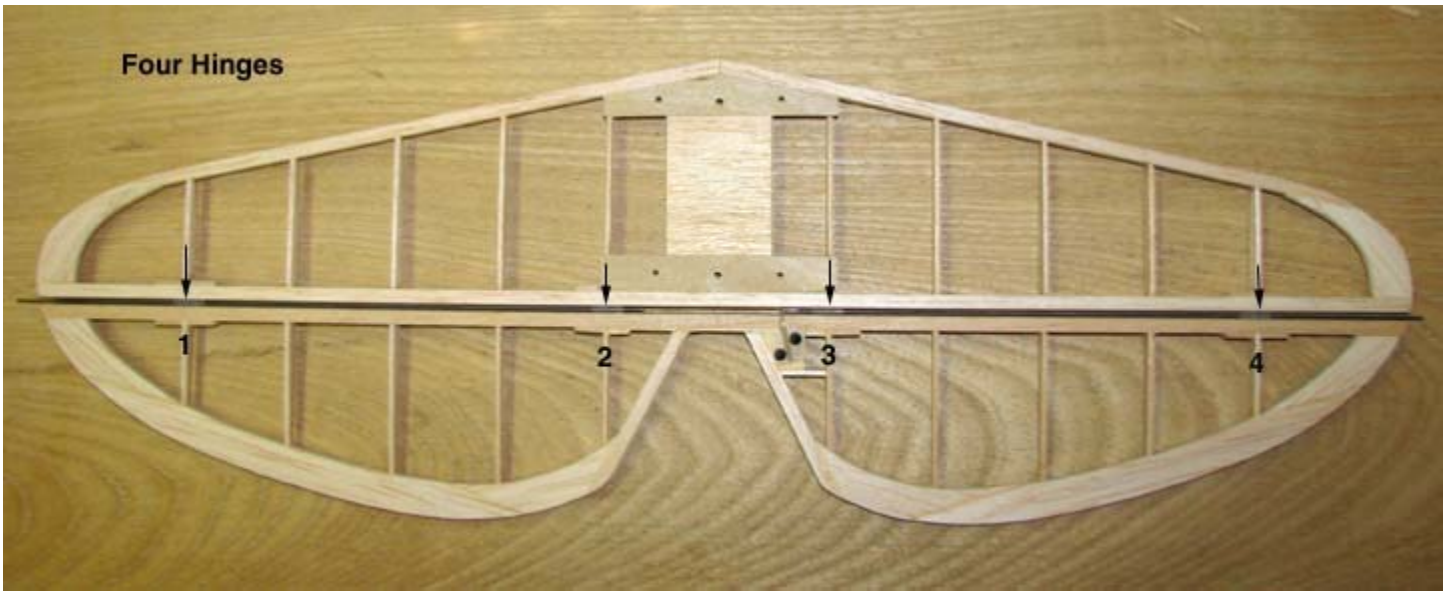
If you remember in Report No. 16, only one 2-56 hole was drilled and tapped in the spruce base for the elevator control horn. In the picture below, the elevator has been taped to the stab and a temporary push rod/clevis connected to the control horn. Then the push rod was oriented to the angle it will exit the side of the fuselage. As you can see, this allows the control horn to be turned to the proper angle to line up with the push rod, which in turn locates the desired position of the second hole in the control horn base.



The picture below is an edge view of the elevator's main spar. This shows you the two hinge halves installed with the a continuous wire pin running through the hinge loops. With a continuous wire pin, these small hinges allowed me to keep the gap down to less than 1/16". The 1/32" piano wire that I have measures 0.032" and it is slightly too tight to go through these hinge loops without a lot forcing. However, I found some 10" lengths of 0.031" piano wire that I got somewhere a long time ago that slips through these small hinge loops with ease.



This picture shows a bottom view of the hinged elevator to the stab. There are four hinges, two on a side as the plans call for. Two separate continuous wire pins are used for the right and left sides of the elevartor to eliminate having to push one continuous hinge pin through four hinges down entire length of the stab. Again, back up pieces have been glued to the spars where the hinge halves go through to reinforce the slot and isolate the interior of the surfaces from the hinge slot openings. If you look close, you can see the elevator's control horn's second mounting hole has been drilled and tapped with the 2-56 cap screw now in place.



This afternoon, I will start carving and shaping the vertical and horizontal tail surfaces to form the rounded leading edges and tapered trailing edges, which will finish up the entire tail structure ready for coverning.....Tandy

David Harding

From: Tandy Walker [tandyw@flash.net]
Sent: Saturday, November 21, 2009 5:16 PM
To: Undisclosed-Recipient: ;@smtp101.sbc.mail.mud.yahoo.com
Subject: 18 Speed 400 Cloudster - Shaping Tail Surfaces and Weighing

Speed 400 Cloudster Project

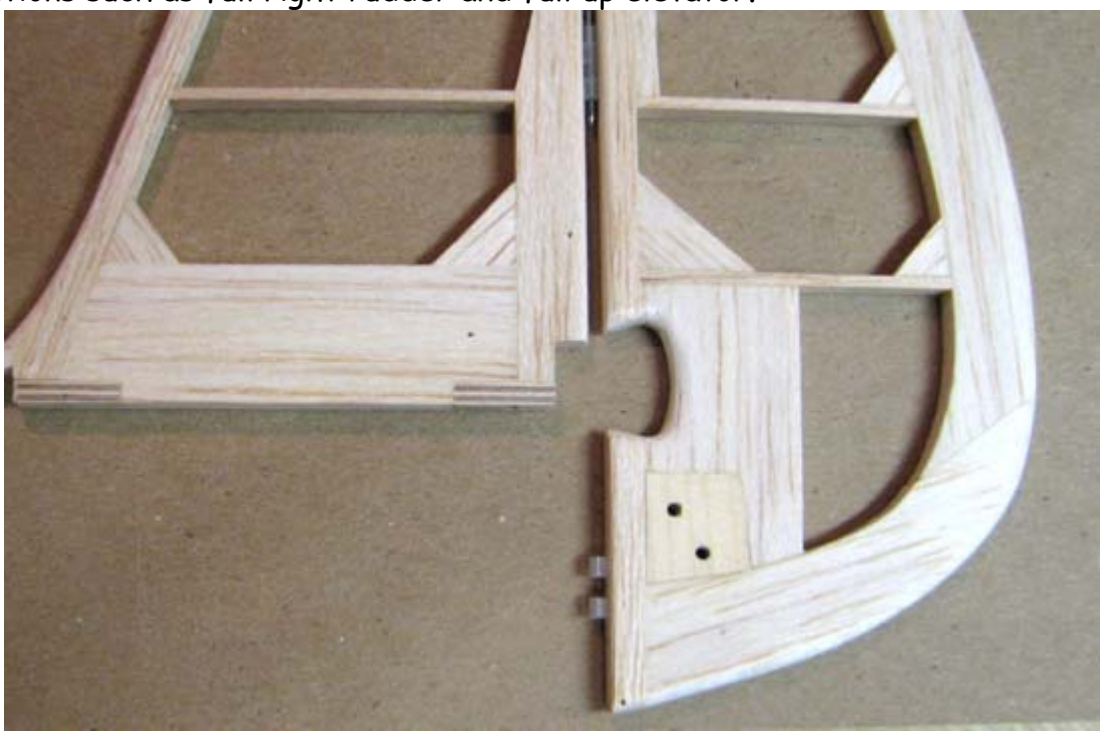
This picture shows the Cloudster's horizontal tail (stab and elevator) after the surfaces have been carved and shaped to form the rounded leading edges and tapered trailing edges. Due to concerns over the small gluing area of the elevator rib ends to the trailing edge, 1/16" gussets were added to one side of the ribs for additional support as shown below. This finishes up the horizontal tail structure, which is now ready for covering.

A weight check was done on the removable horizontal tail as shown below. You can see that the hinged horizontal tail structure weights 16 grams (0.56 oz), without the control horn attached.

The picture below shows the Cloudster's vertical tail (fin and rudder) after the surfaces have been carved and shaped to form the rounded leading edges and tapered trailing edges. A weight check was also done on the removable vertical tail and the hinged vertical tail structure weights 5 grams (0.18 oz), without the control horn attached. Also notice that 3/16" gussets were added to one side of three of the rudder ribs for additional support. This finishes up the vertical tail structure, which is now ready for covering.

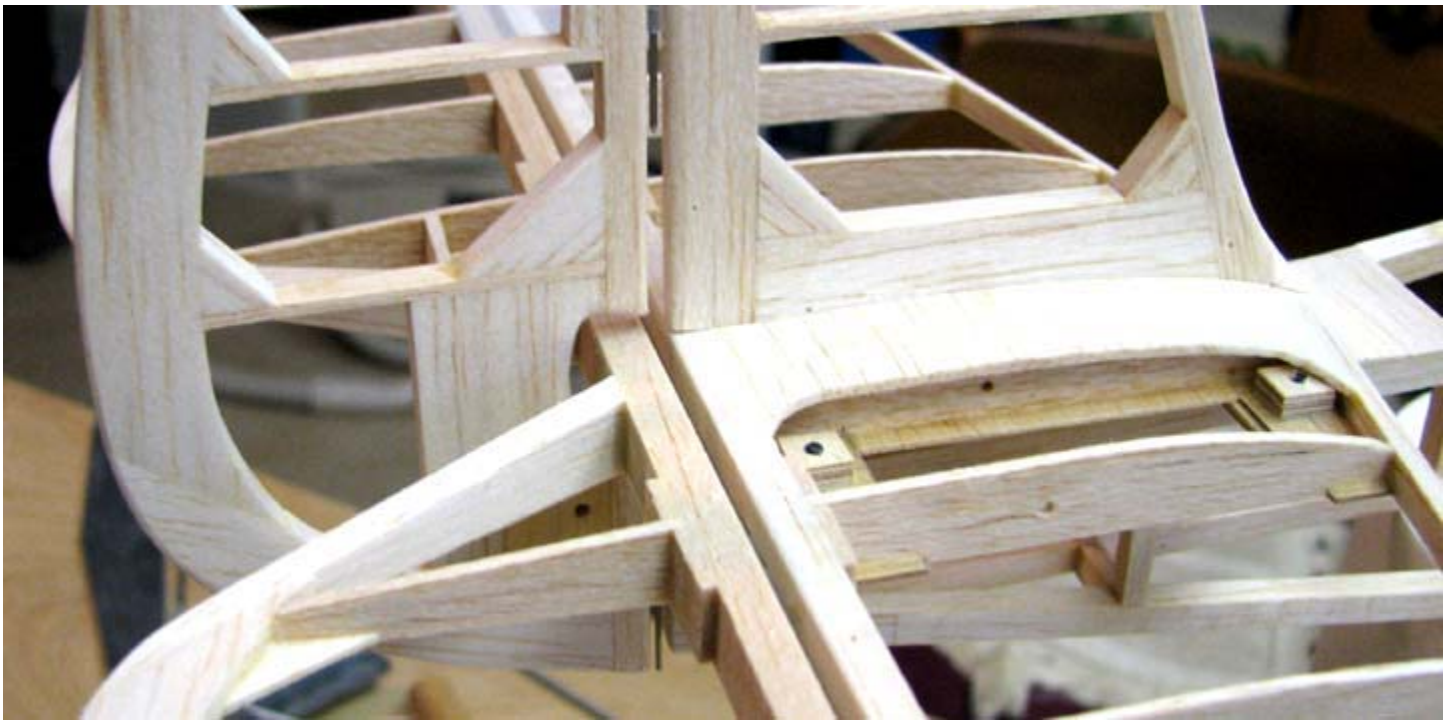
This is a close up of the fin leading edge fairing that interfaces with the stabs leading edge.

This is a close up of the of the rudder's cut out for the elevator's continuous spar pass through. Notice that a radius has been provided around the rudder's cut out opening to eliminate combination surface deflections such as full right rudder and full up elevator.

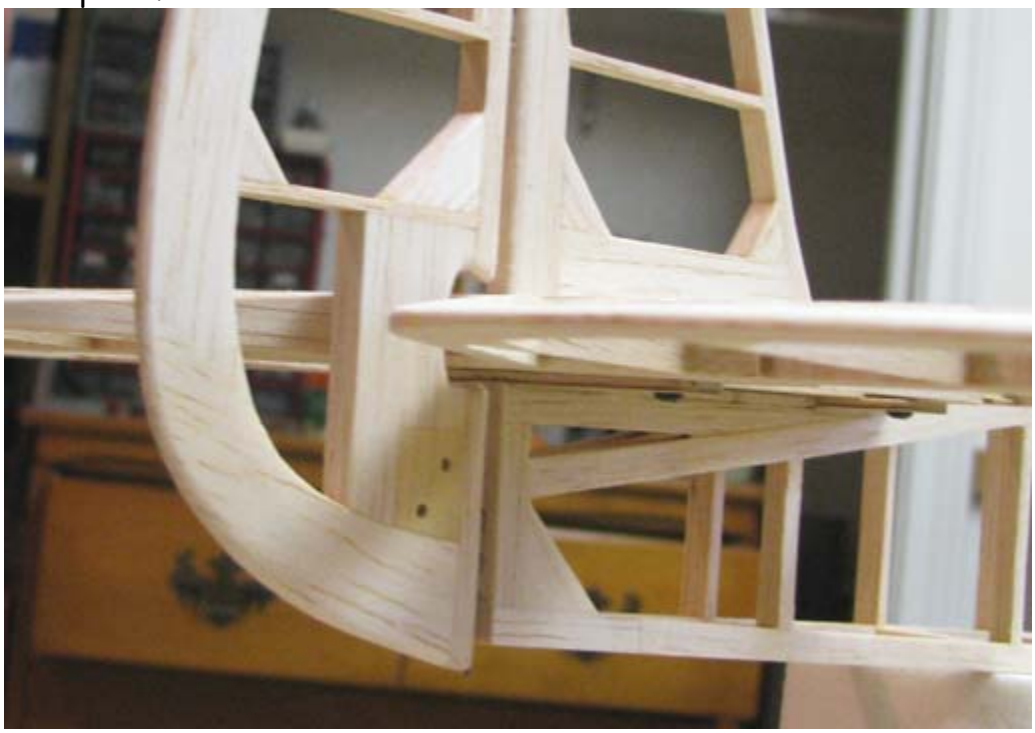


This side view close up of the tail assembly showing how the elevator's continuous spar passes through

the rudder cut out.



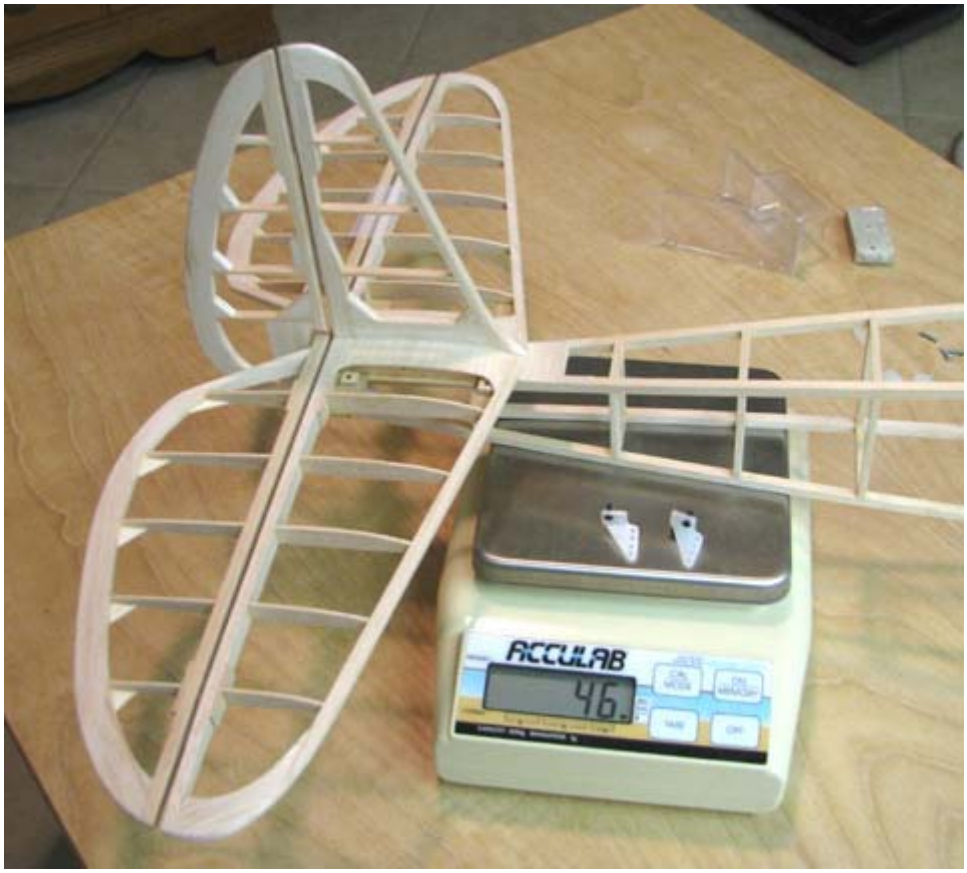
This is another rear view close up of the tail assembly showing the elevator's continuous spar passes through the rudder cut out. Notice that the bottom of the rudder has not been trimmed off even with the bottom of the fuselage yet. This will not be done until the fuselage's bottom bulkheads and stringers are glued in place.



As you may recall from Report No. 5, the fuselage primary structure weighed 18 grams (0.63 oz).

After building on the stab mounting platform on the rear of the fuselage, the fuselage weight has increased up to 20 grams (0.71 oz) as shown below. Therefore, the stab mounting platform only resulted in a 2 gram increase.

The completed tail assembly was mounted to the fuselage with the four 2-56 cap screws and weighed as shown below. The weight has now increased to 46 grams (1.62 oz). Notice in the picture that this weight includes the two control horns and four 2-56 cap screws to secure the control horns to the control surfaces.



This past week I have been working using a pair of +2.75 reading glasses that I bought at Walgreens for under ten bucks at Jim Lollar's recommendation. Since I broke my prescription glasses, I had to have something to provide close up vision with my single focus lens implants for distance. They took a little getting use to, but I am getting by pretty well. Hopefully my prescription glass repair will be ready Monday.....Tandy

David Harding

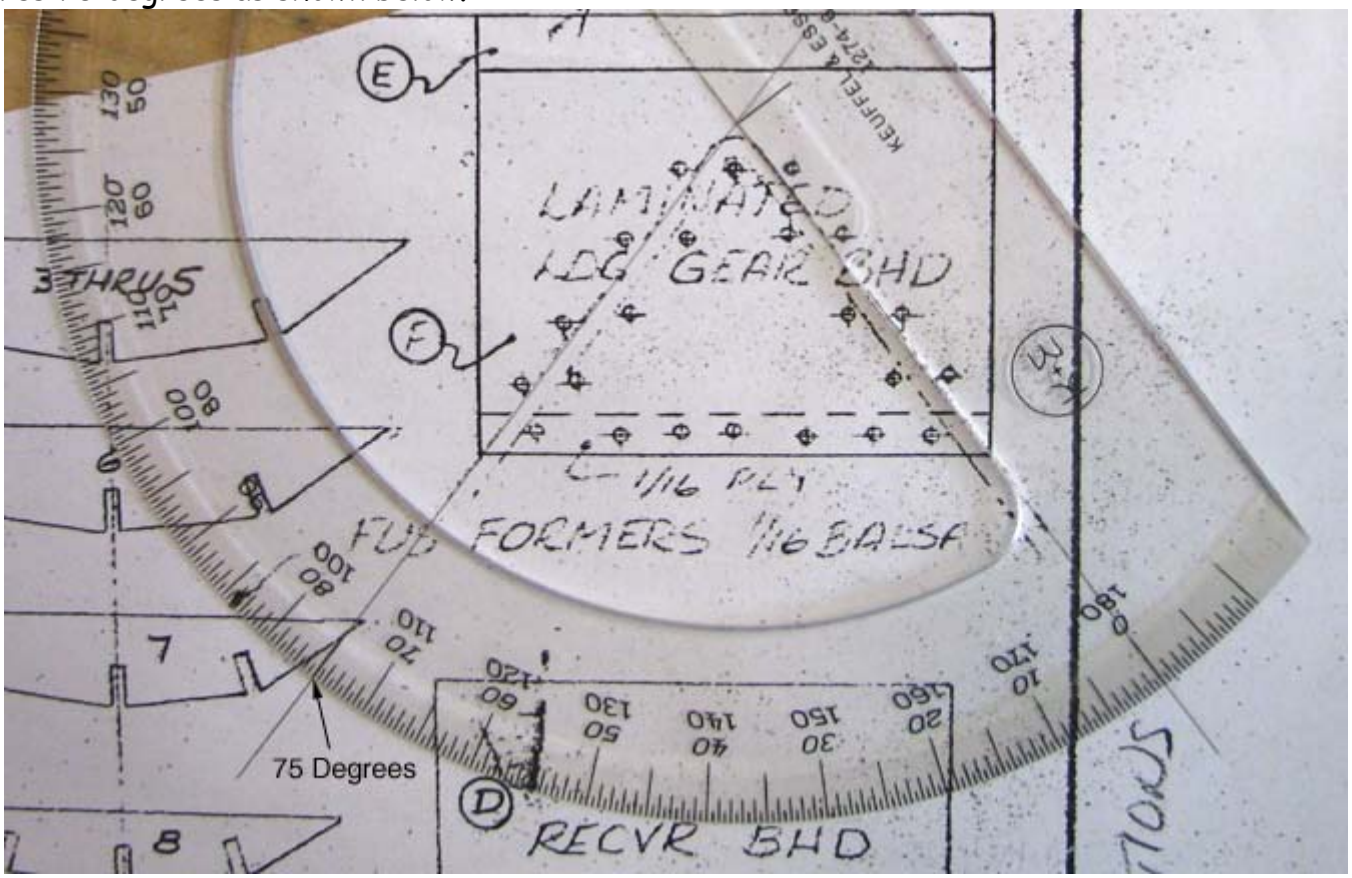
From: Tandy Walker [tandyw@flash.net]
Sent: Monday, November 23, 2009 3:51 PM
To: Undisclosed-Recipient: ;@smtp101.sbc.mail.mud.yahoo.com
Subject: 19 Speed 400 Cloudster - Landing Gear

Speed 400 Cloudster Project

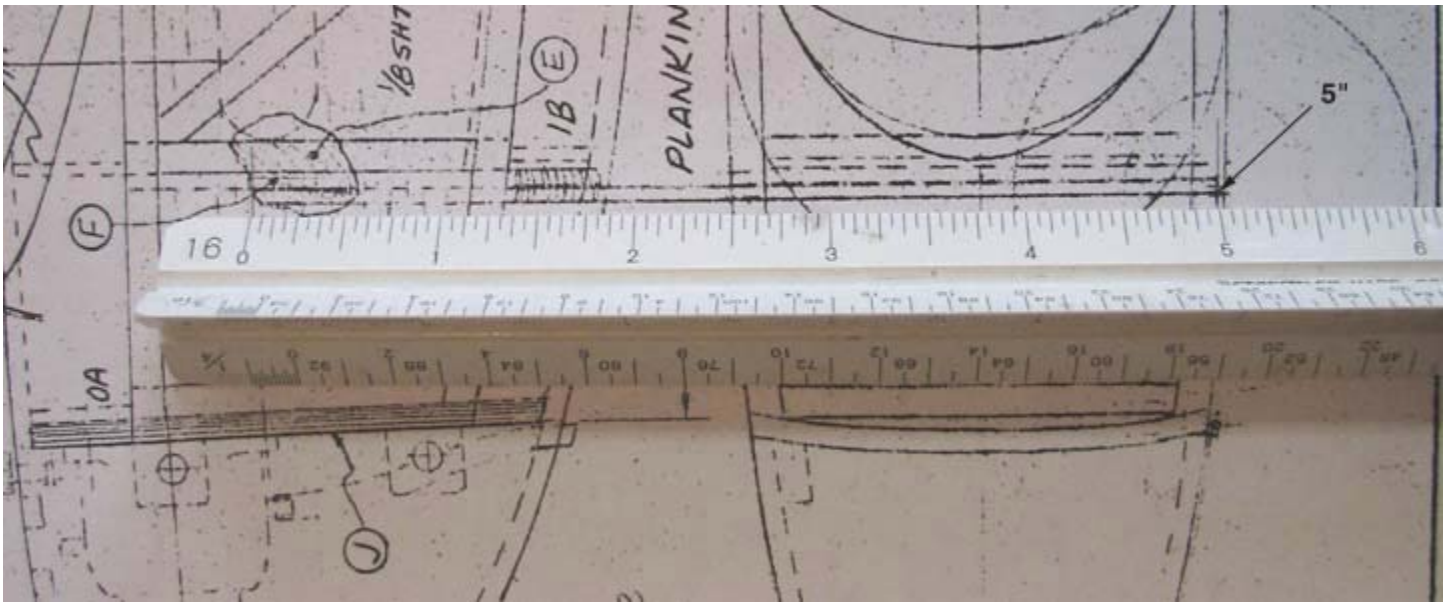
Sue and I spent a lot of this past weekend decorating our for Christmas. It is a little early, but we are flying down to Houston to spend Thanksgiving with Sue's son (Rick and wife Andrea) and we wanted them up when we return on Saturday. With Sue still recovering from her broken shoulder, our neighbor Donald Thompson was kind enough to come over Saturday morning and help me with getting the 28 boxes of decorations down out of the attic (***I handed the boxes down from the attic and Don stacked them on the garage floor for me***). The picture below shows our decorated Christmas tree that we put up in front of the bay window in the "President's Room" (the named given to this room by my dad before his passing).

I did find some time to work on the Cloudster's landing gear Sunday afternoon. After careful review of both the Cleveland and Jim Adams Cloudster plans, I could not find a landing gear wire size called out nor a true view of the wire landing gear layout. So a little reconstruction work had to be done. 1/16" diameter piano wire

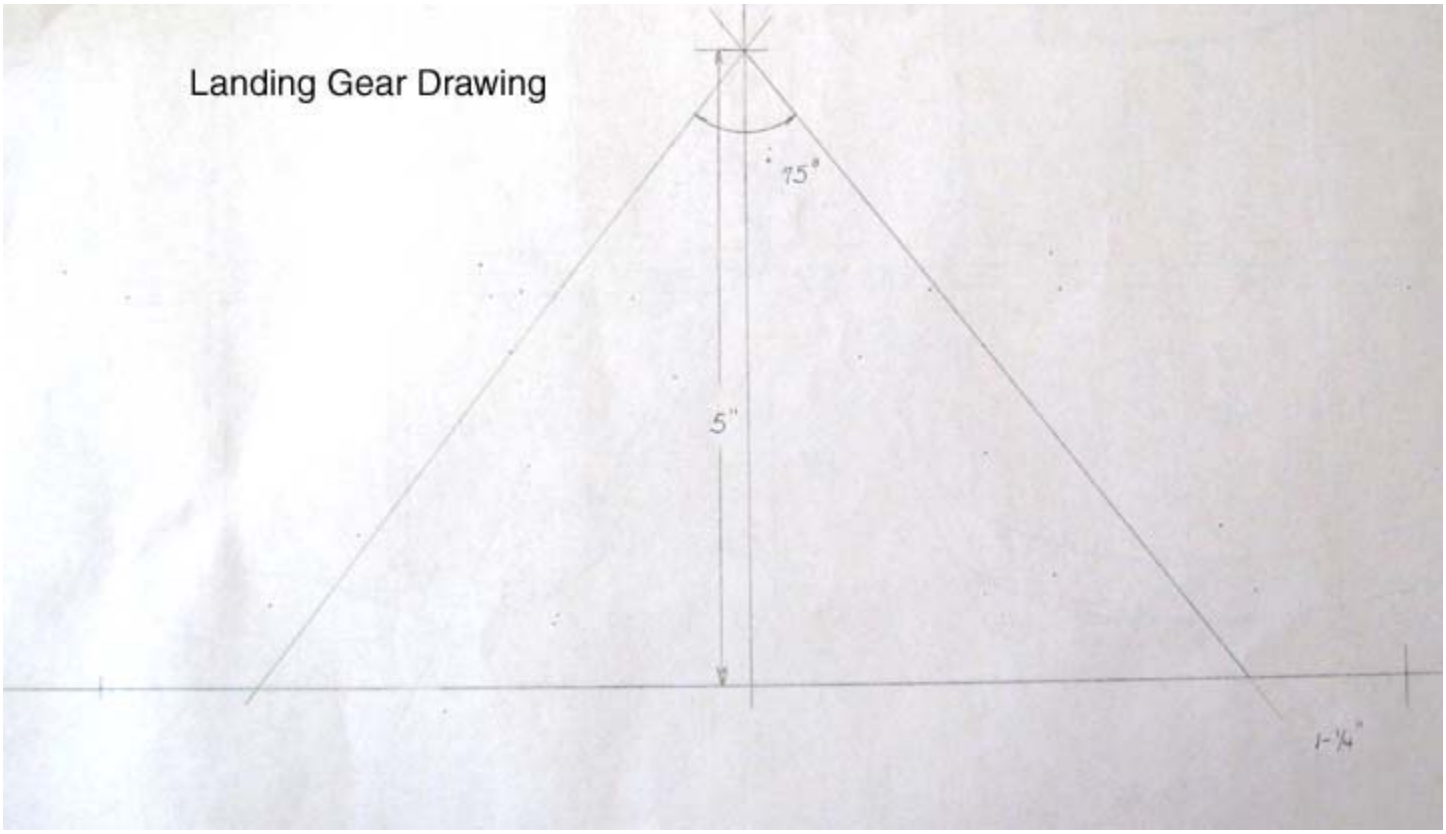
was selected for the landing gear. On the Jim Adams plans, the apex angle of the landing gear wire measures 75 degrees as shown below.



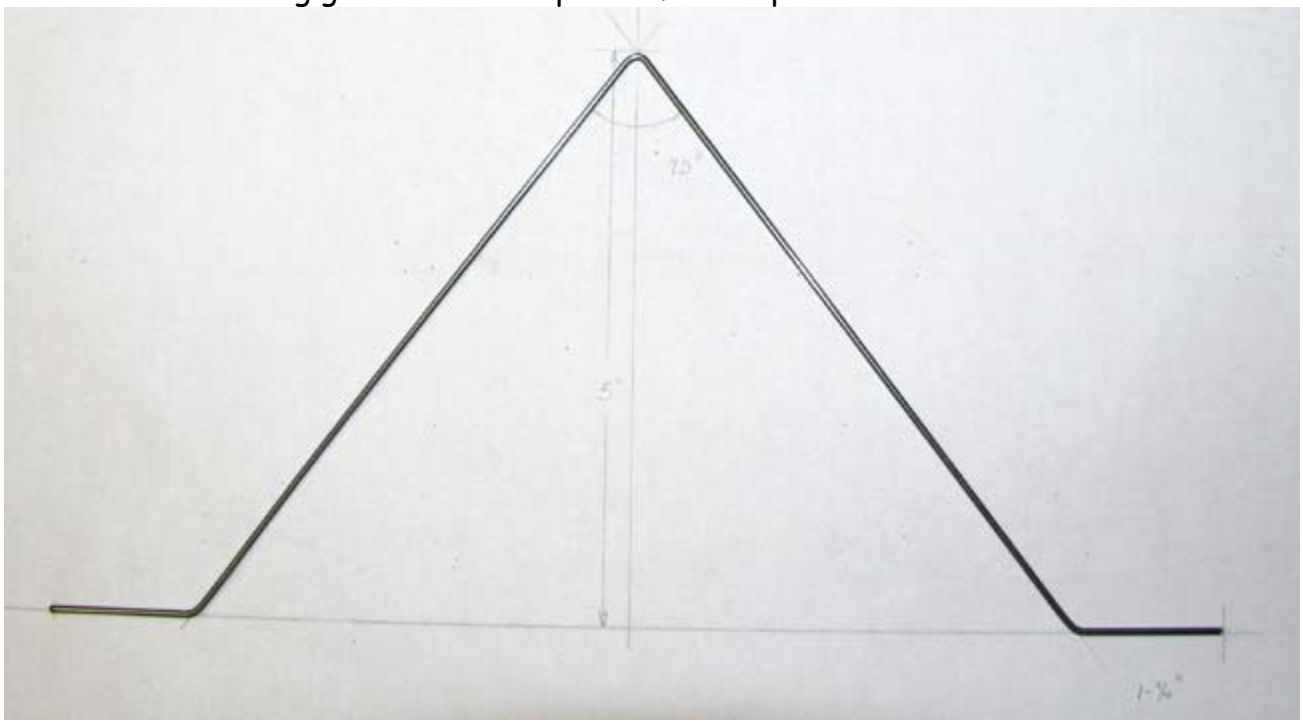
Also on the Jim Adams plans, the vertical distance from the top of the apex angle to landing gear axle measures 5" as shown below.



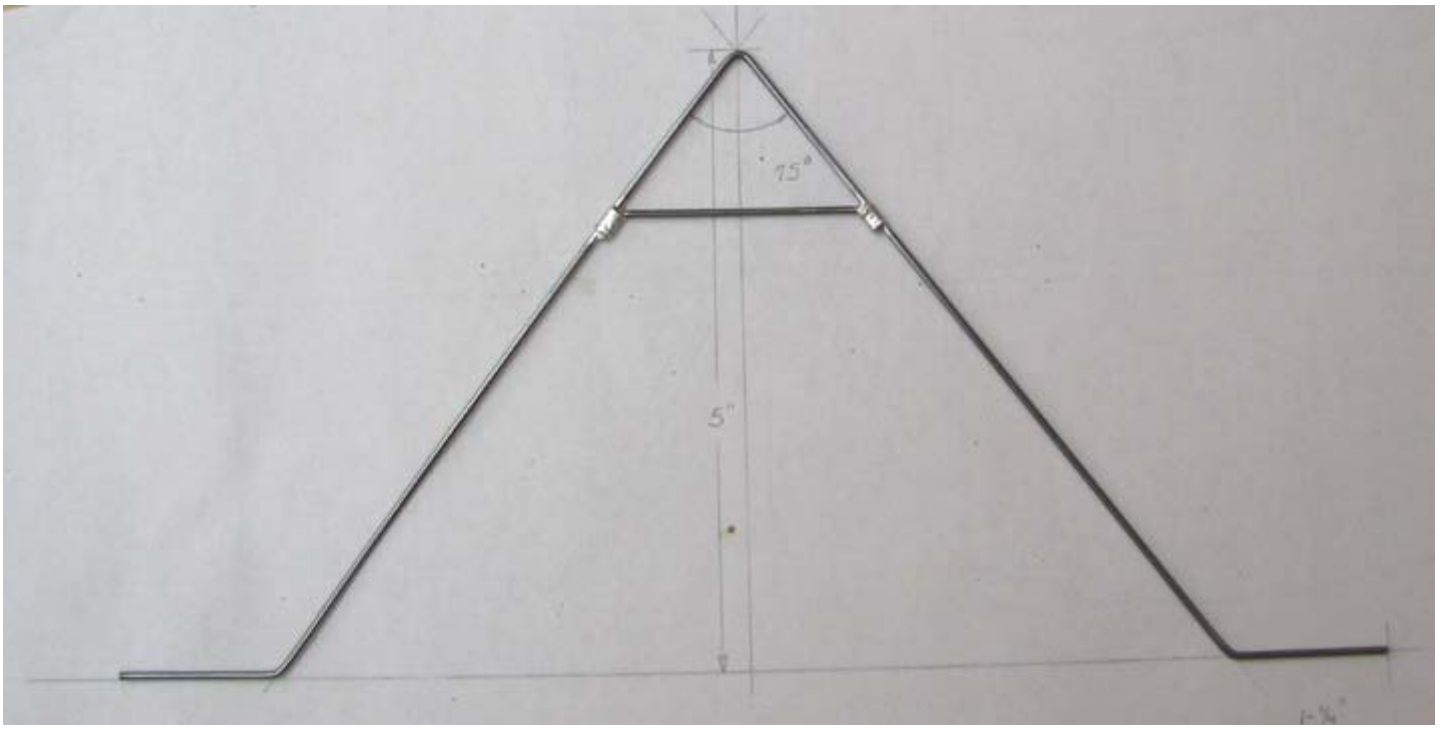
Given the 75 degree apex angle and the 5" vertical distance, a true view of the wire landing gear drawing can be laid out as shown below.



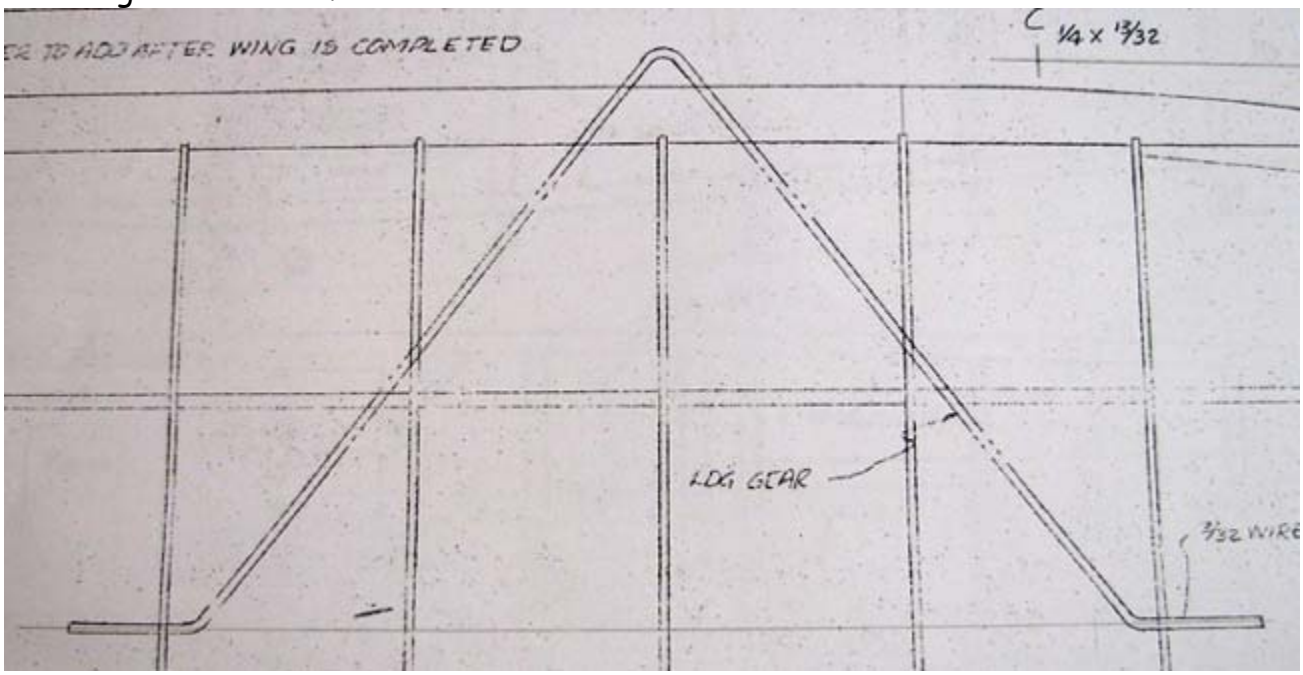
The landing gear was bent up out of 1/16" piano wire as shown below.



Then the cross brace was made out of 1/16" piano wire. It was positioned, wrapped with small brass wire, and soldered in place as shown below.



Did you ever look and look for something and then later discover it is right in front of you? Well, after I finished recreating the landing gear drawing, bending up the wire landing gear and cross brace, and soldering it in place, I discovered that the landing gear wire size and drawing was right there on the left wing drawing shown below----Well DUH! The plan call out is for 3/32" landing gear wire and the vertical height of the drawing was 4-3/4", which by the way disagrees with the 5" shown on the plan's fuselage drawing shown above.



Since there is very little difference in the landing gear drawings and the one I have already made is

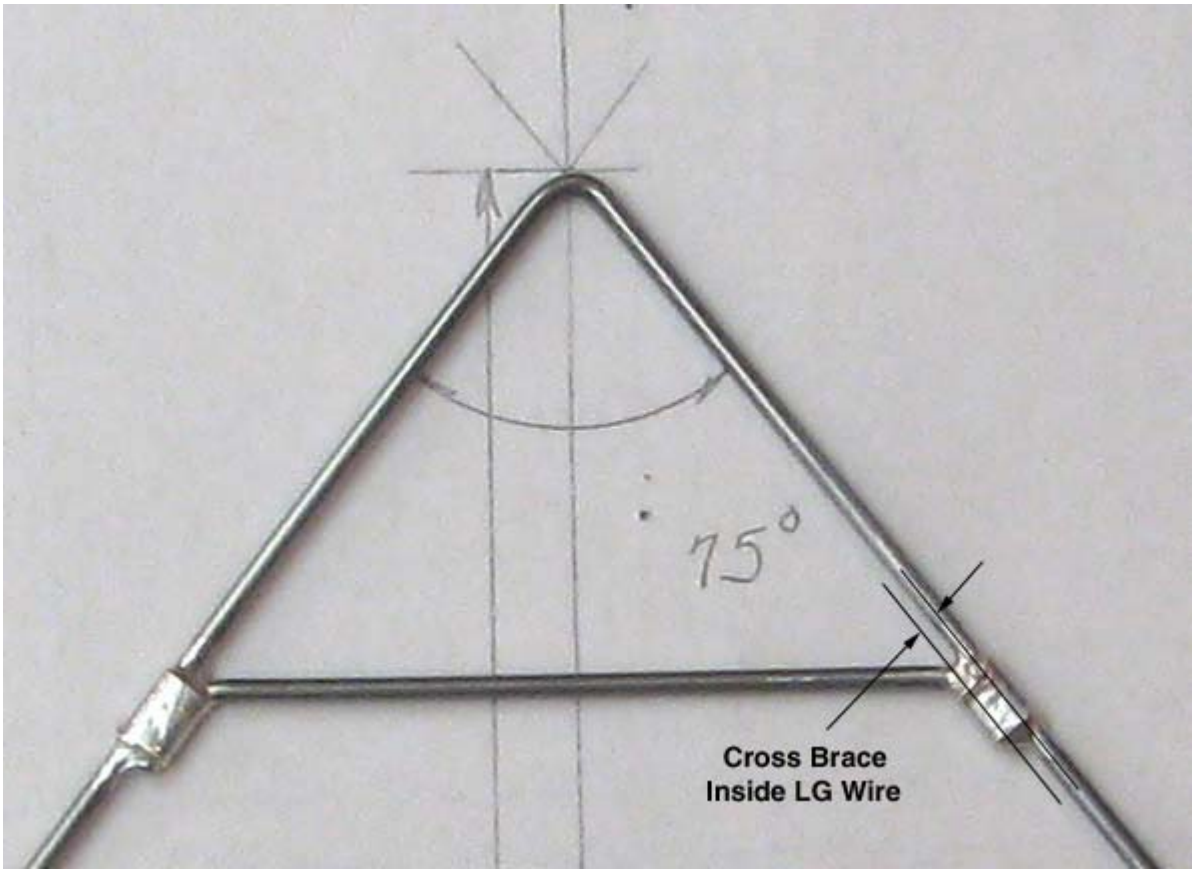
lighter, I am going forward with it. I am going to look into making the landing gear removable without having to much of a weight penalty. However, this may not be possible, but that is the subject of a later report.....Tandy

David Harding

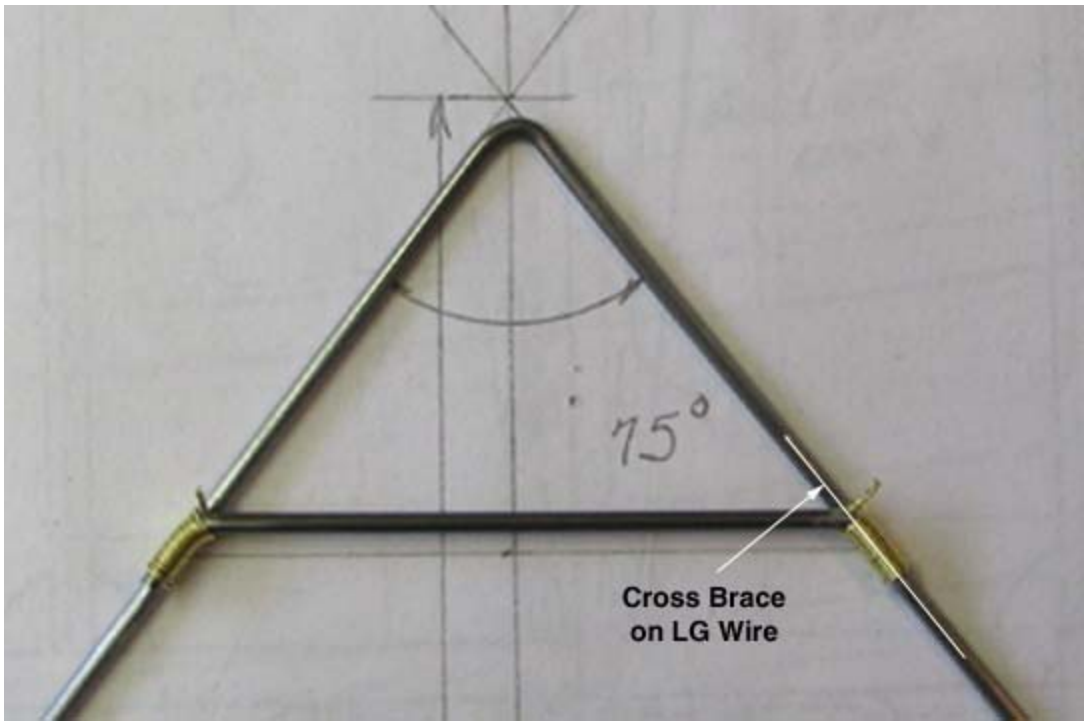
From: Tandy Walker [tandyw@flash.net]
Sent: Tuesday, November 24, 2009 9:01 PM
To: Undisclosed-Recipient: ;@smtp108.sbc.mail.mud.yahoo.com
Subject: 20 Speed 400 Cloudster - Rework of th e Wire Landing Gear

Speed 400 Cloudster Project

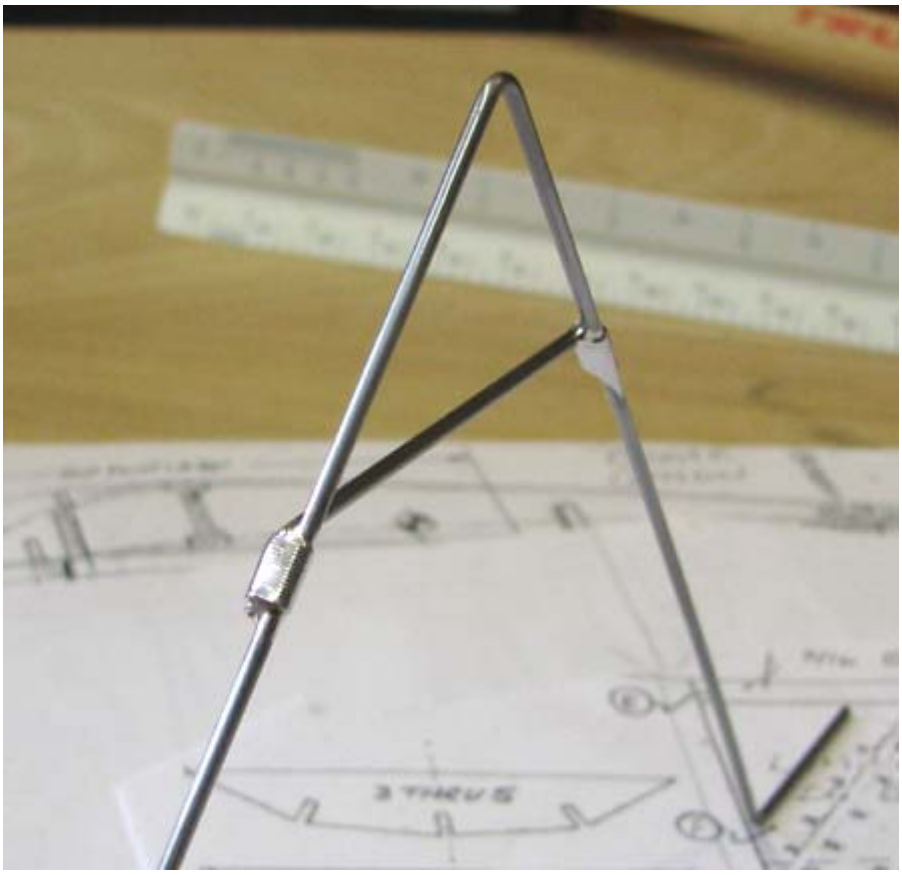
In yesterday's Report 19, this picture of the wire landing gear with the cross brace soldered in place was presented. An error was made in that the cross brace bent ends were wire wrapped and soldered inside the wire landing gear as shown below.



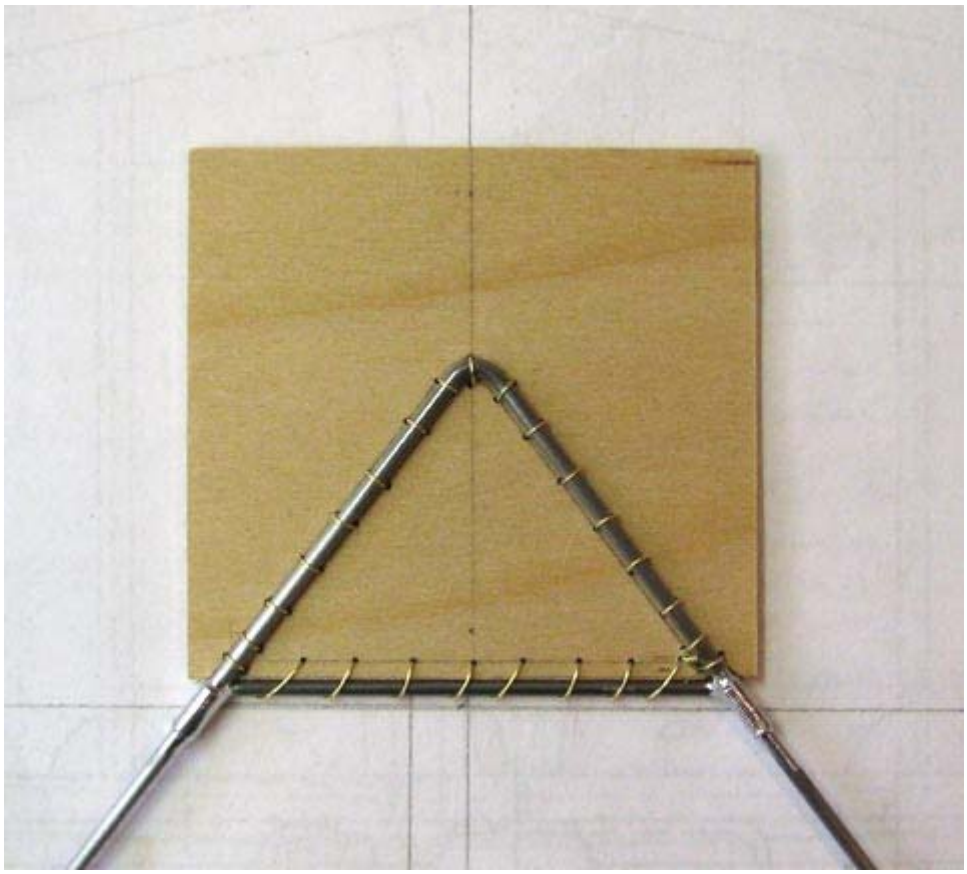
Using a Dremel cut off wheel, the wire wrapping was cut down one side and then heated up and removed. A new cross brace was made and correctly wire wrapped in place on the wire landing gear as shown below.



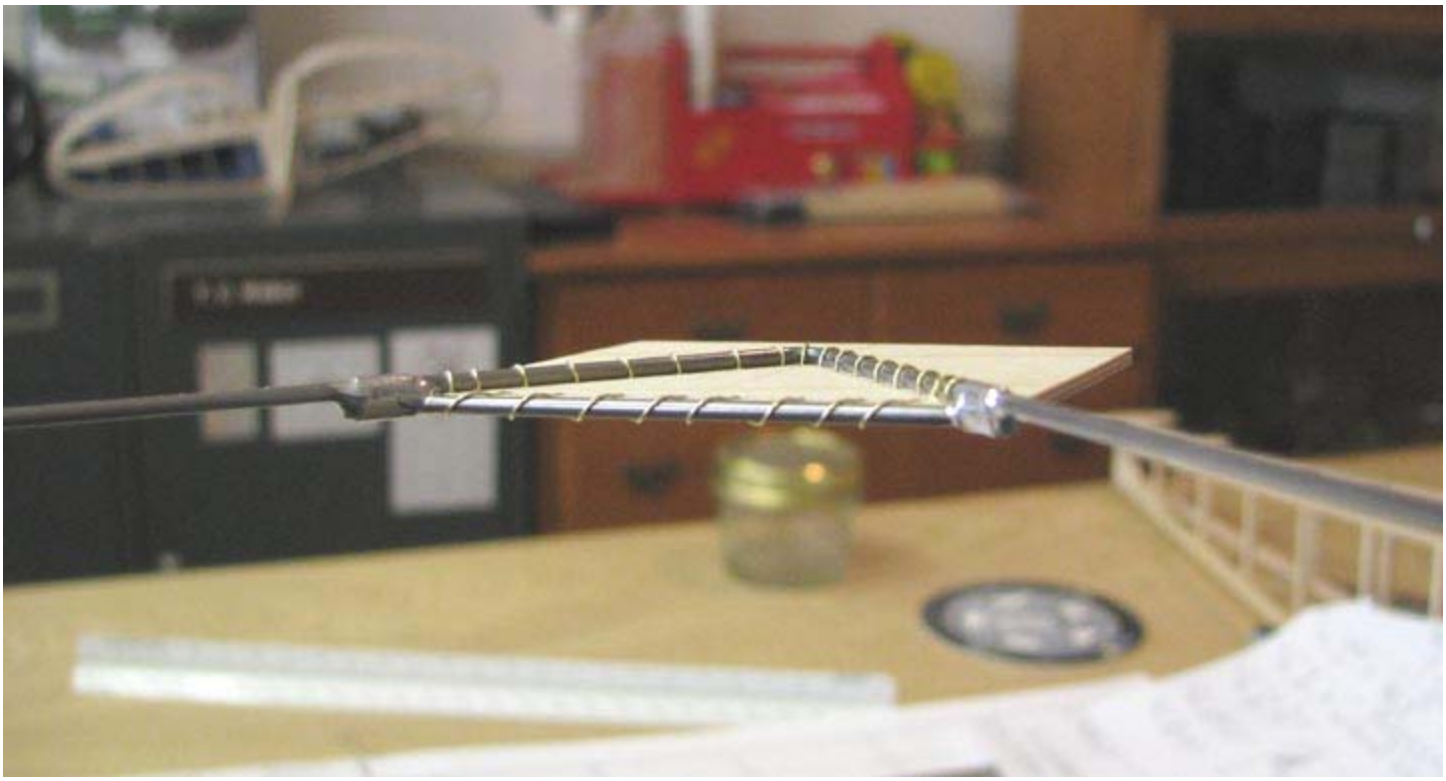
This shows a picture from the front of the new wire wrapping after it had been soldered in place. You see, when the wire landing gear is laced to its 1/16" plywood mounting plate, the bottom edge of the plate butts down against the cross brace.



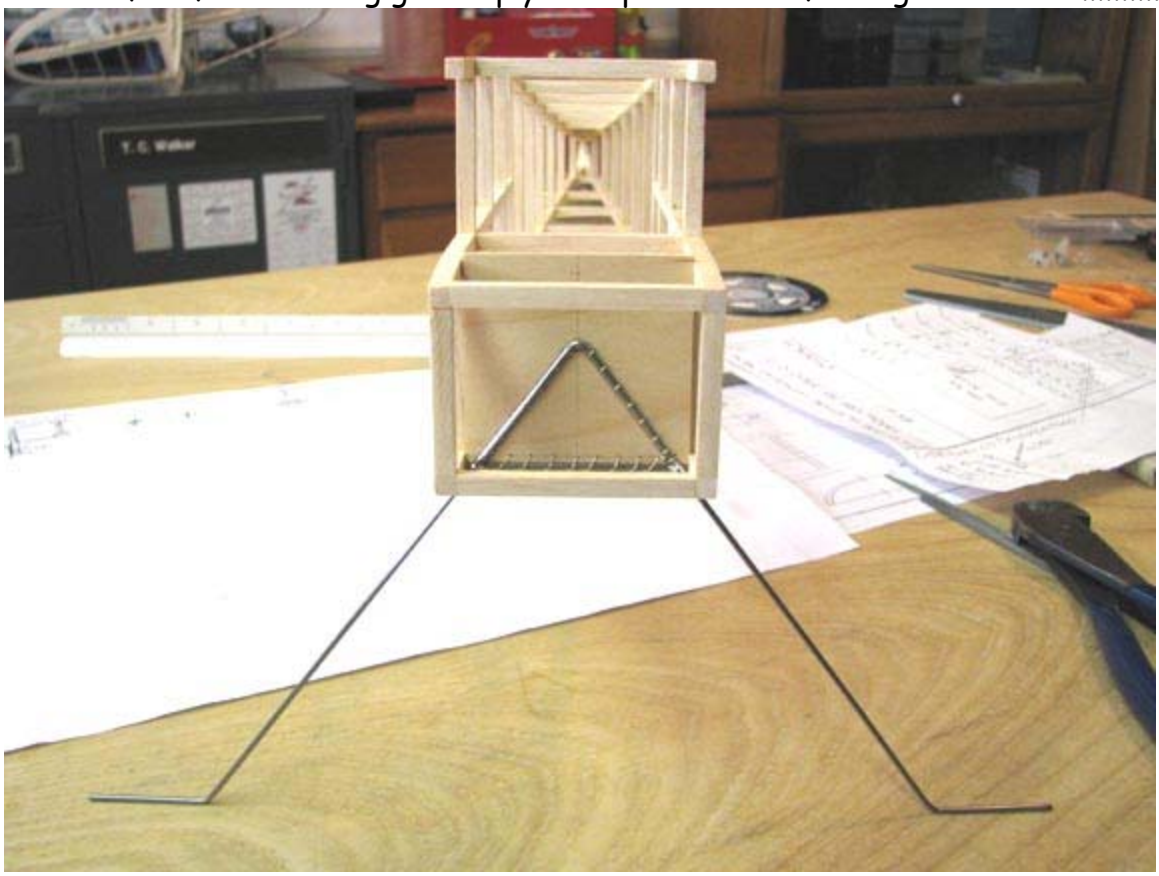
28 gauge brass wire was used to lace the wire landing gear to the 1/16" plywood mounting plate as shown below.



This shows an edge view of the landing gear laced to the plywood mounting plate and why I had to change the cross brace location.



This shows a trial fit of the landing gear's plywood plate in the fuselage structure.....Tandy



David Harding

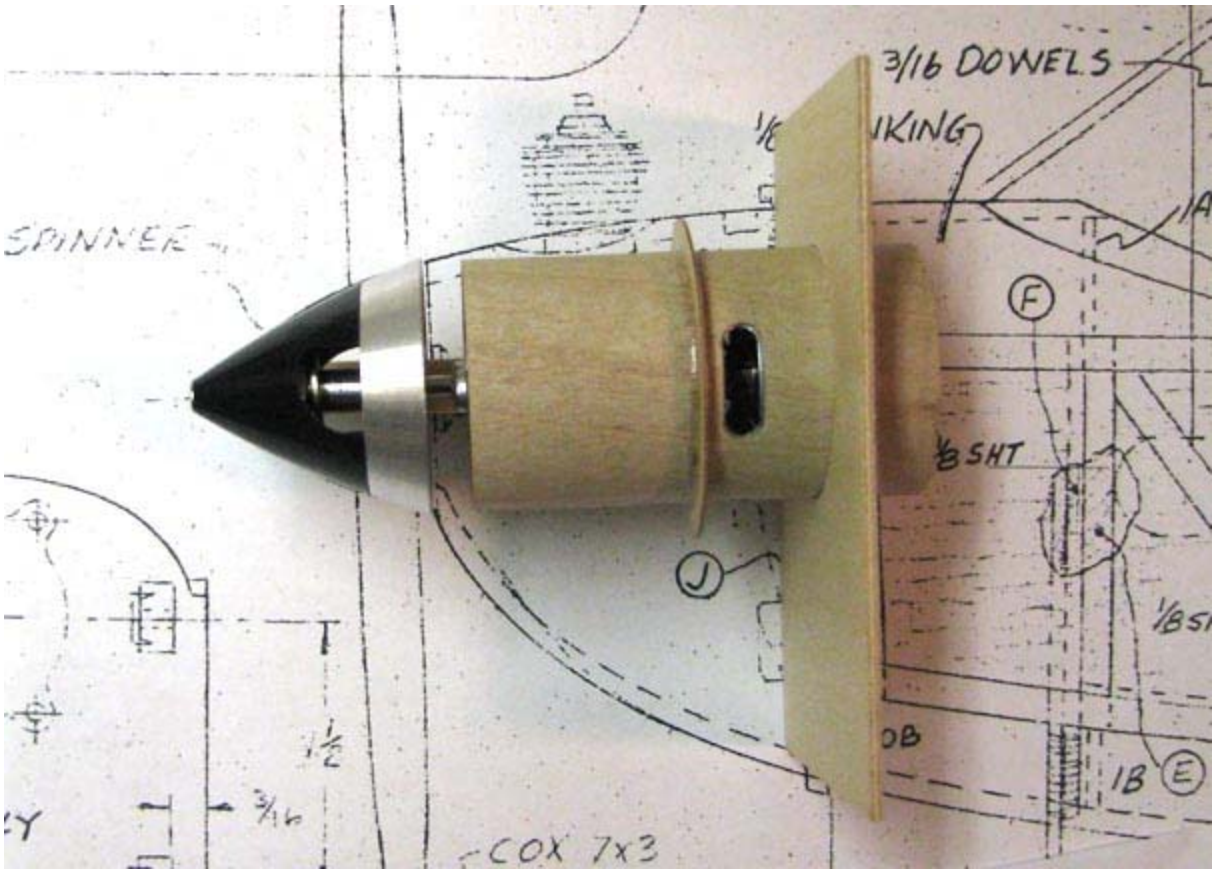
From: Tandy Walker [tandyw@flash.net]
Sent: Saturday, November 28, 2009 11:34 PM
To: Undisclosed-Recipient: ;@smtp108.sbc.mail.mud.yahoo.com
Subject: 21 Speed 400 Cloudster - Hobby Lobby First Order Arrival

Speed 400 Cloudster Project

I received my first order from Hobby Lobby on Tuesday before Thanksgiving. However, I did not get to open it until this evening. Shown in the picture below are: (1) four sets of red polarized connectors, (2) a JESI 12 Amp ESC, and (3) two motor mount wafers. I am not sure why all of the connectors are red. Seems like half of them should have been black? Also, I probably will not use the two motor mount wafers now that I have a motor mount built.

Also shown in the picture below are: (1) two Pro Lite 1350 mAh 7.4 volt battery packs, (2) two 6 volt Speed 400 motors, and (3) 1-3/16" spinner/adapter. The only things I seem to be missing are the two props (coming in a second order) and black connectors, which I will have to order. I may order some different type connectors as I am not sure I even like these new ones!

The picture below shows a trial fit of the 1-3/16" spinner/adapter mounted on the Speed 400 motor and placed on the Cloudster plans, which shows a good fit.....Tandy

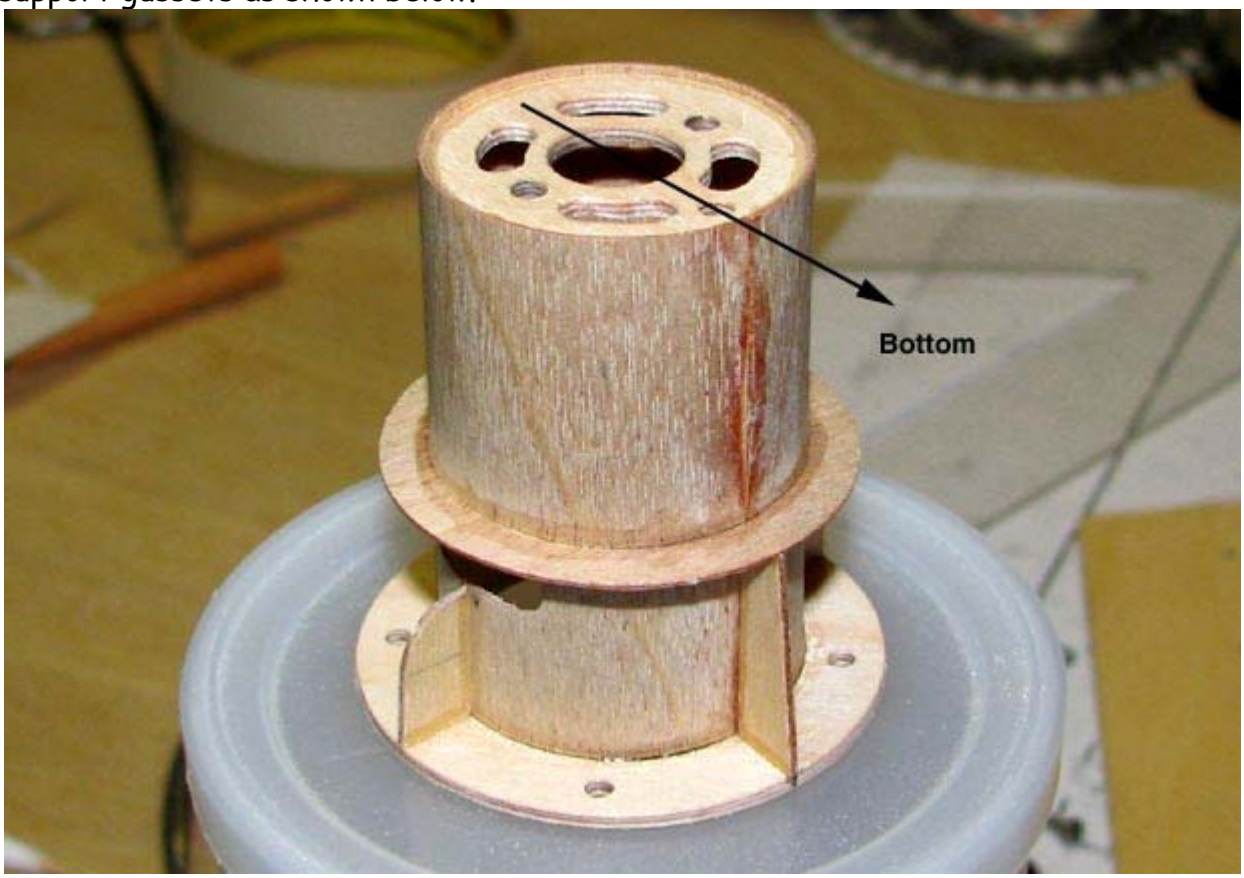

3/16 DOWELS
SPINNER
F
J
COX 7x3

David Harding

From: Tandy Walker [tandyw@flash.net]
Sent: Monday, November 30, 2009 12:04 AM
To: Undisclosed-Recipient: ;@smtp103.sbc.mail.mud.yahoo.com
Subject: 22 Speed 400 Cloudster - Motor Mount Completion

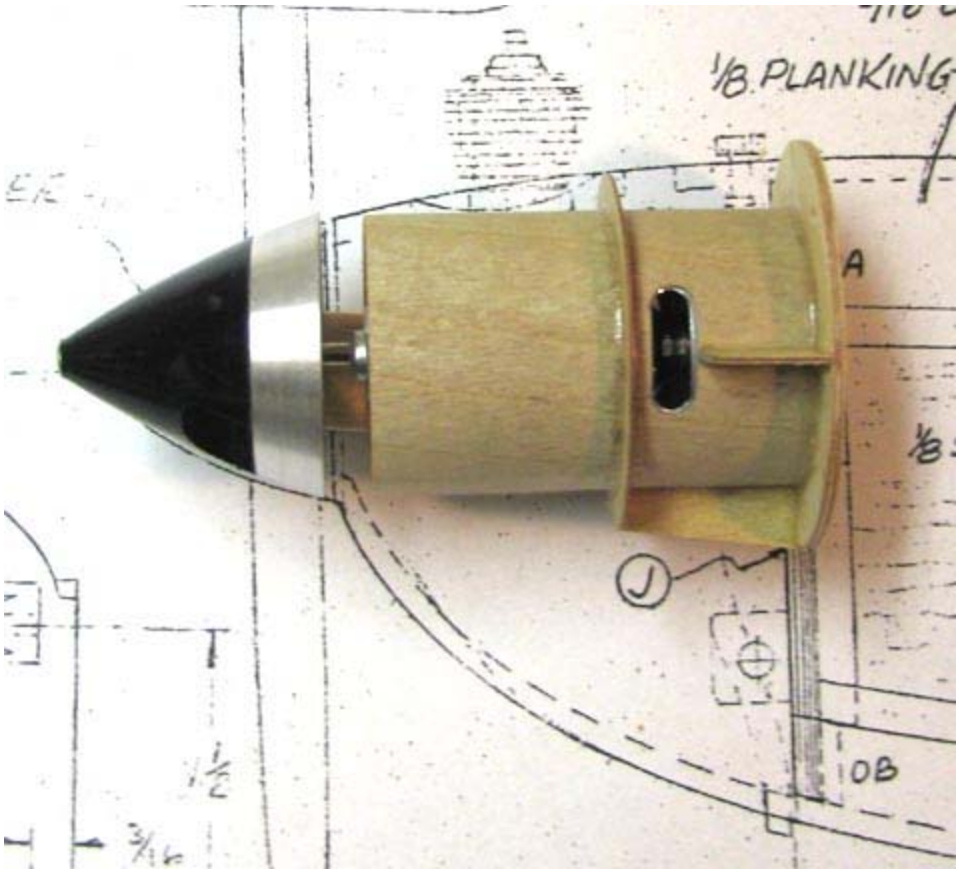
Speed 400 Cloudster Project

This afternoon and evening I completed the motor mount. This entailed measuring and cutting the 1/64" plywood motor tube to length, completing the rear mounting ring including trimming the ring's outside and drilling the four 2-56 mounting holes, gluing the rear mounting ring to the motor tube, and adding three of the four side support gussets as shown below.



This is a close up view of the rear mounting ring from the back of the mount.

This picture shows the Speed 400 motor mounted in the motor tube with spinner/adapter attached and the assembly laid on the plans to check the location of the rear face of the spinner. Notice that the top of the rear mounting ring has to be trimmed down later to fit inside of the cowl contour and the fourth support gusset added at the top.....Tandy.

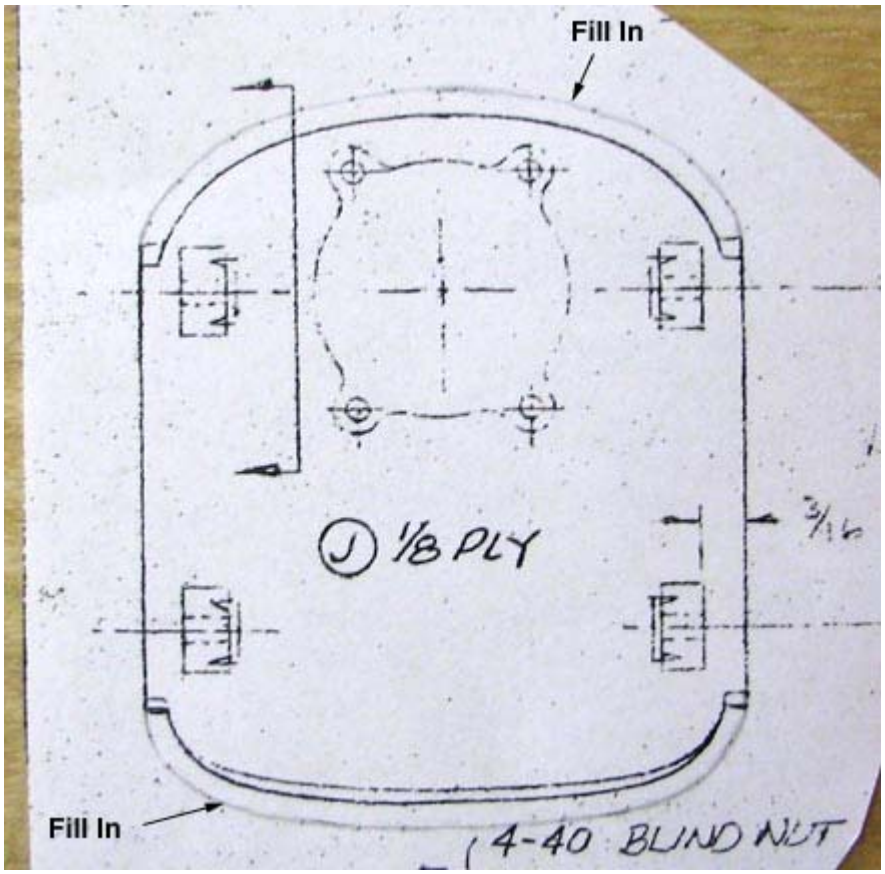

1/8. PLANKING
A
J
10B

David Harding

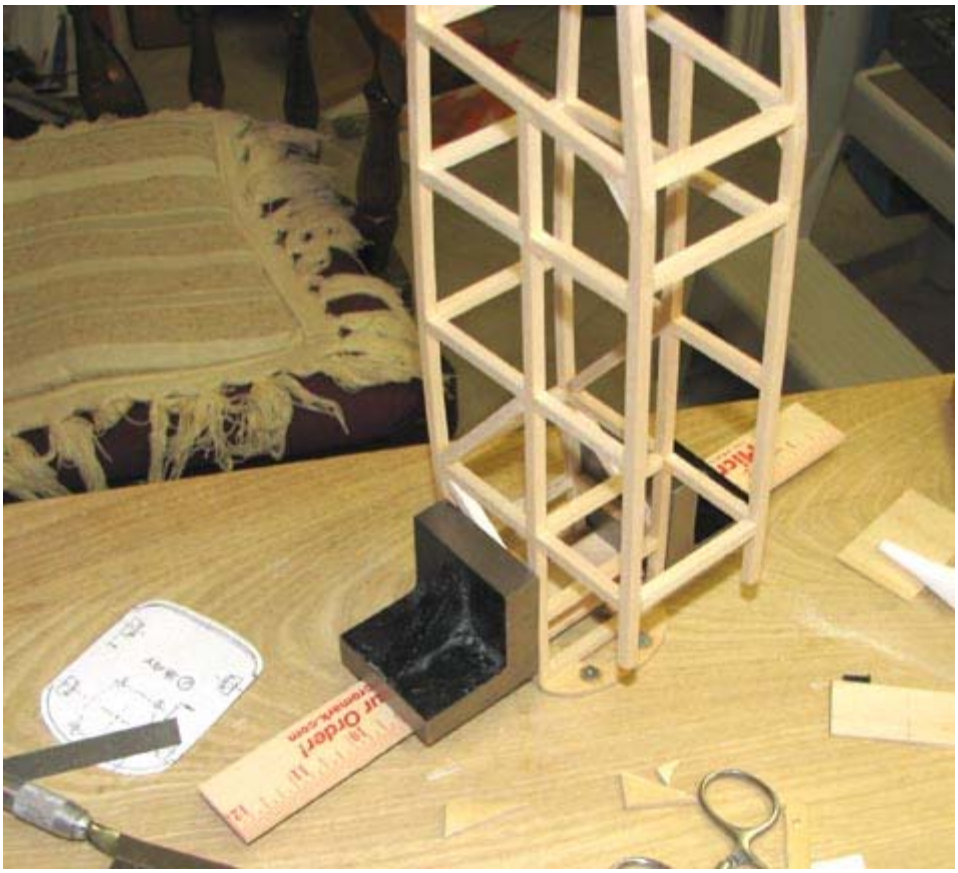
From: Tandy Walker [tandyw@flash.net]
Sent: Monday, November 30, 2009 5:46 PM
To: Undisclosed-Recipient: ;@smtp108.sbc.mail.mud.yahoo.com
Subject: 23 Speed 400 Cloudster - Firewall and Balance Check

Speed 400 Cloudster Project

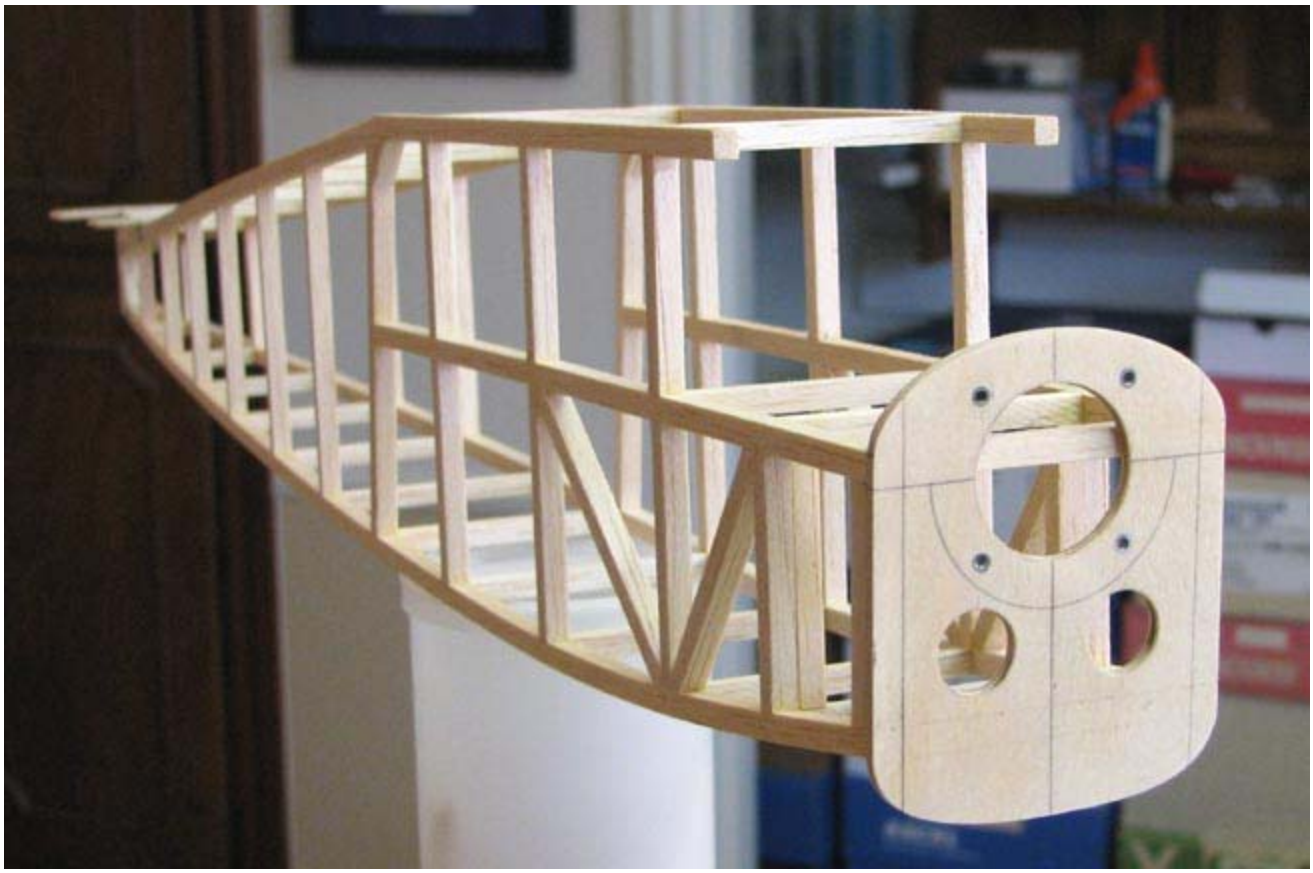
The plan pattern for the Cloudster's firewall is shown below. The top and bottom portions are shown cut out for 1/8" planking to extend to the front face of the firewall. However, I prefer that the cowl butt up aganist an all plywood firewall so I filled in the cut outs as shown below.



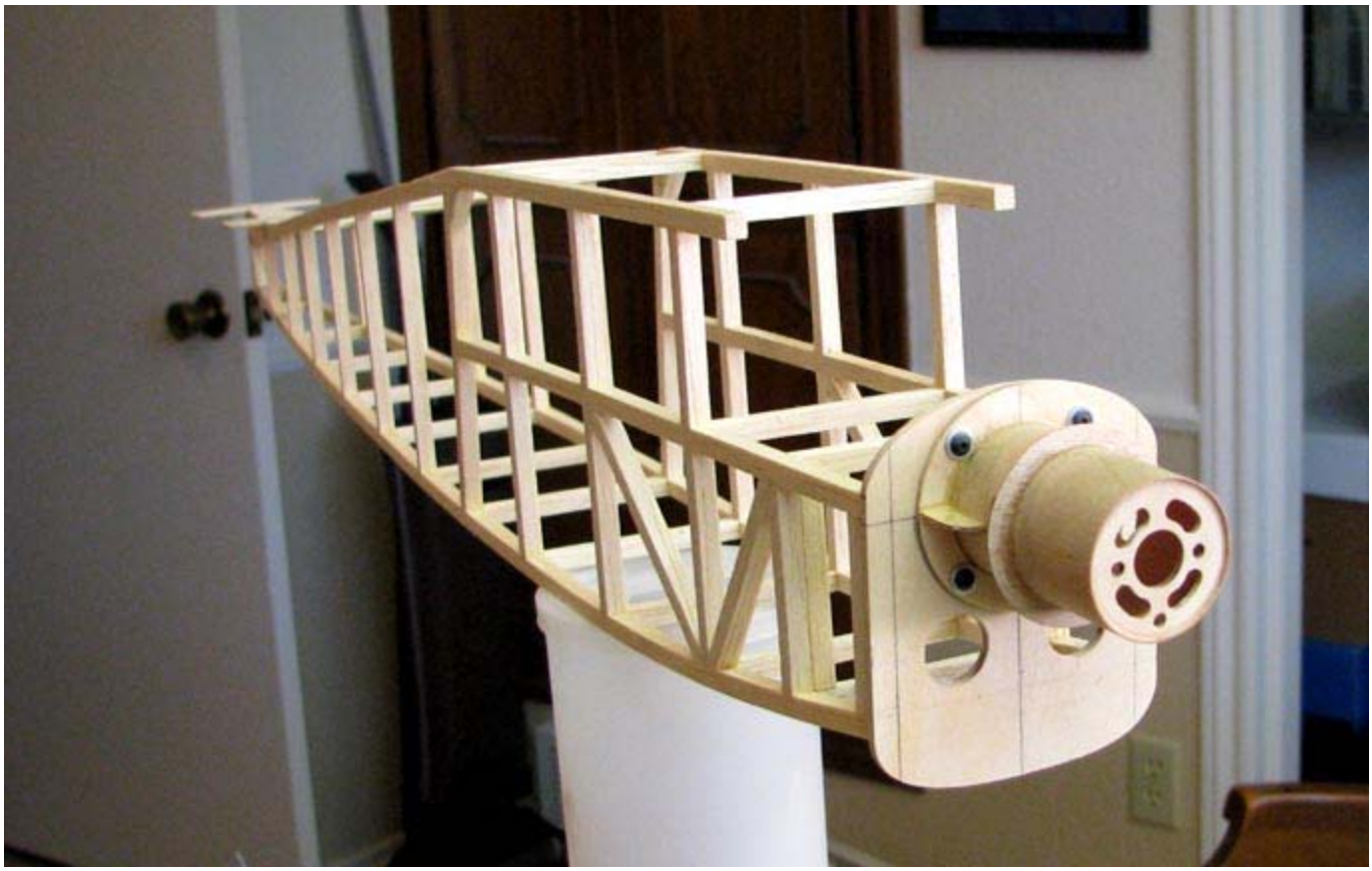
The firewall was cut out of 3/32" plywood and bonded to the front face of the fuselage main frame as shown below. A wooden ruler was run through the two front side members of the fuselage frame and two heavy steel squares were placed on either side of the ruler to form a type of press while the aliphatic glue dried.



The picture below shows the finished firewall with lightening holes bonded to the front face of the fuselage main frame.

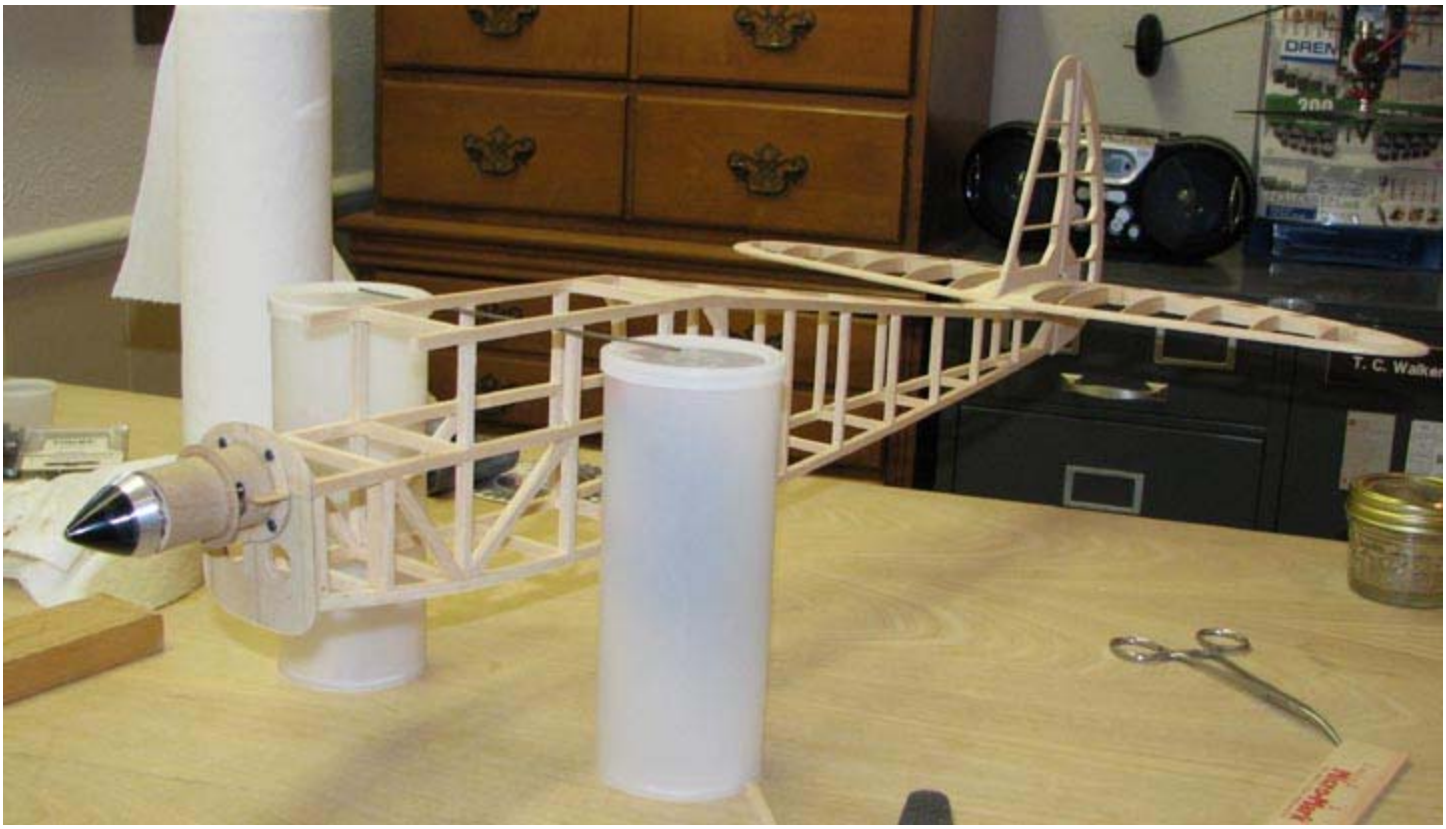


The picture below shows the hand made Speed 400 motor mount secured to the firewall with four 2-56 cap screws. Notice that the motor mount rear mounting ring will have to be trimmed down about an 1/8" across the top to permit the cowl to fit up to the firewall.



The Speed 400 motor, spinner/adapter, and tail assembly were attached to the fuselage main frame as shown below. The total weight at this point is 139 grams (4.9 oz).

A 1/16" piano wire was run through to the top longerons and adjusted to balance point as shown below for a CG status check. The balance point is 3/16" forward of the desired CG, which is a good indication the model can be balanced without ballast weight.....Tandy

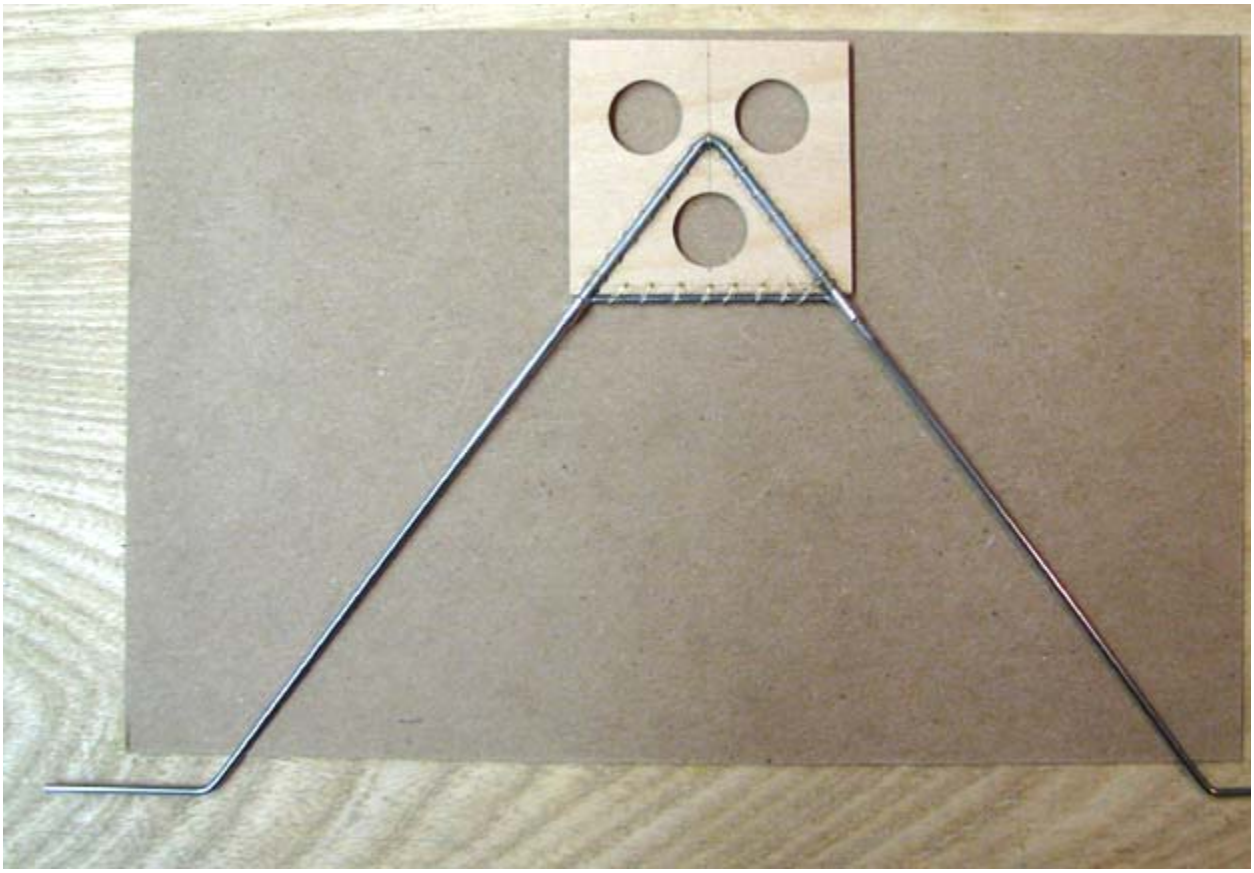


David Harding

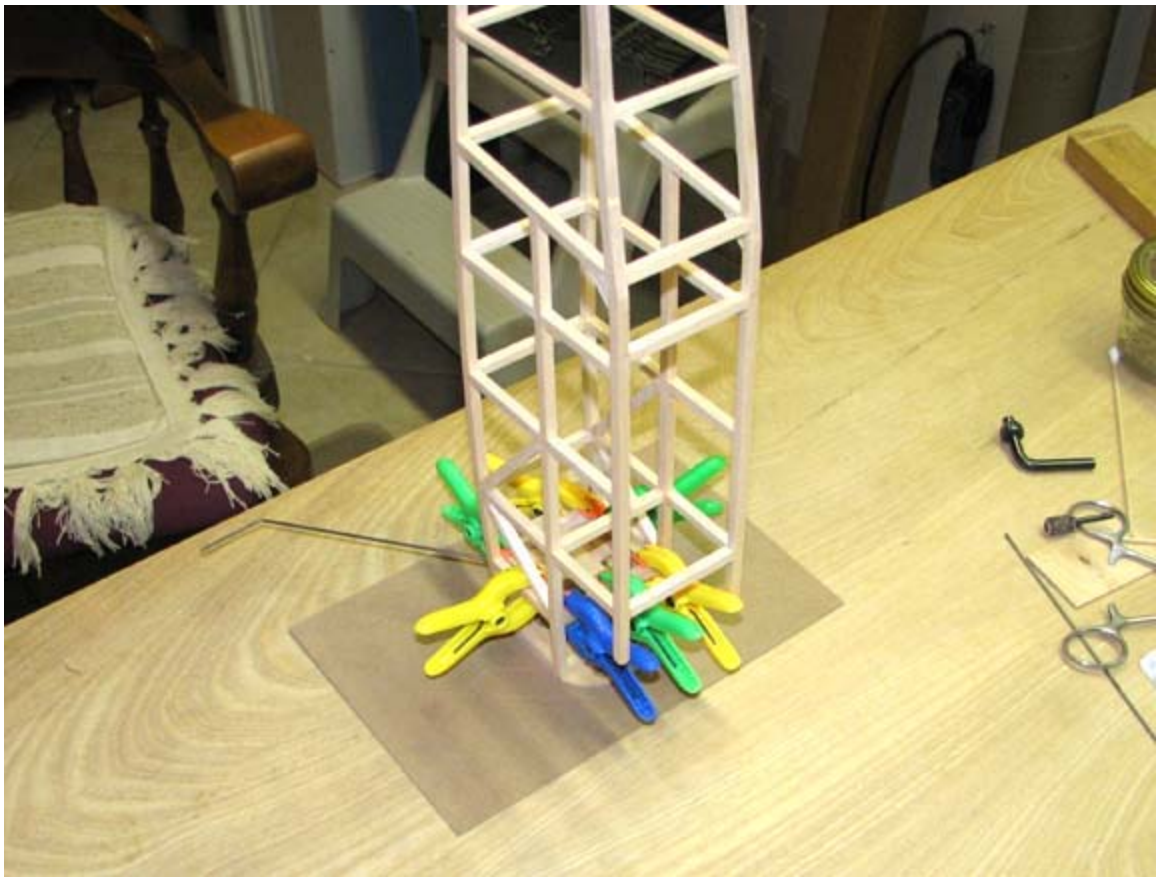
From: Tandy Walker [tandyw@flash.net]
Sent: Tuesday, December 01, 2009 4:10 PM
To: Undisclosed-Recipient: ;@smtp107.sbc.mail.mud.yahoo.com
Subject: 24 Speed 400 Cloudster - Landing Gear Installation

Speed 400 Cloudster Project

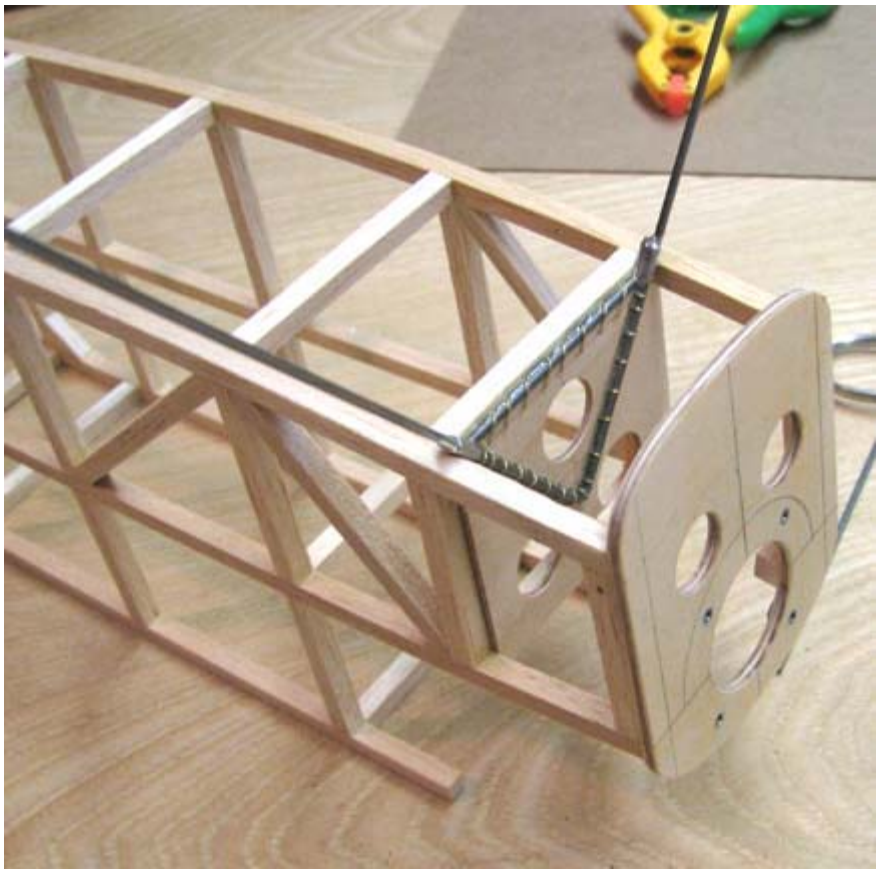
In Report No. 20, the landing gear was laced to the 1/16" plywood mounting plate with small brass wire. As part of the Cloudster's on going weight saving effort, three lightening holes were carefully located and made in the mounting plate as shown below before it was glued into the fuselage main frame. Instead of using epoxy to pot the wire lacing in place, two coats of CA was applied on both sides of the mounting plate, which is much lighter in weight than epoxy.



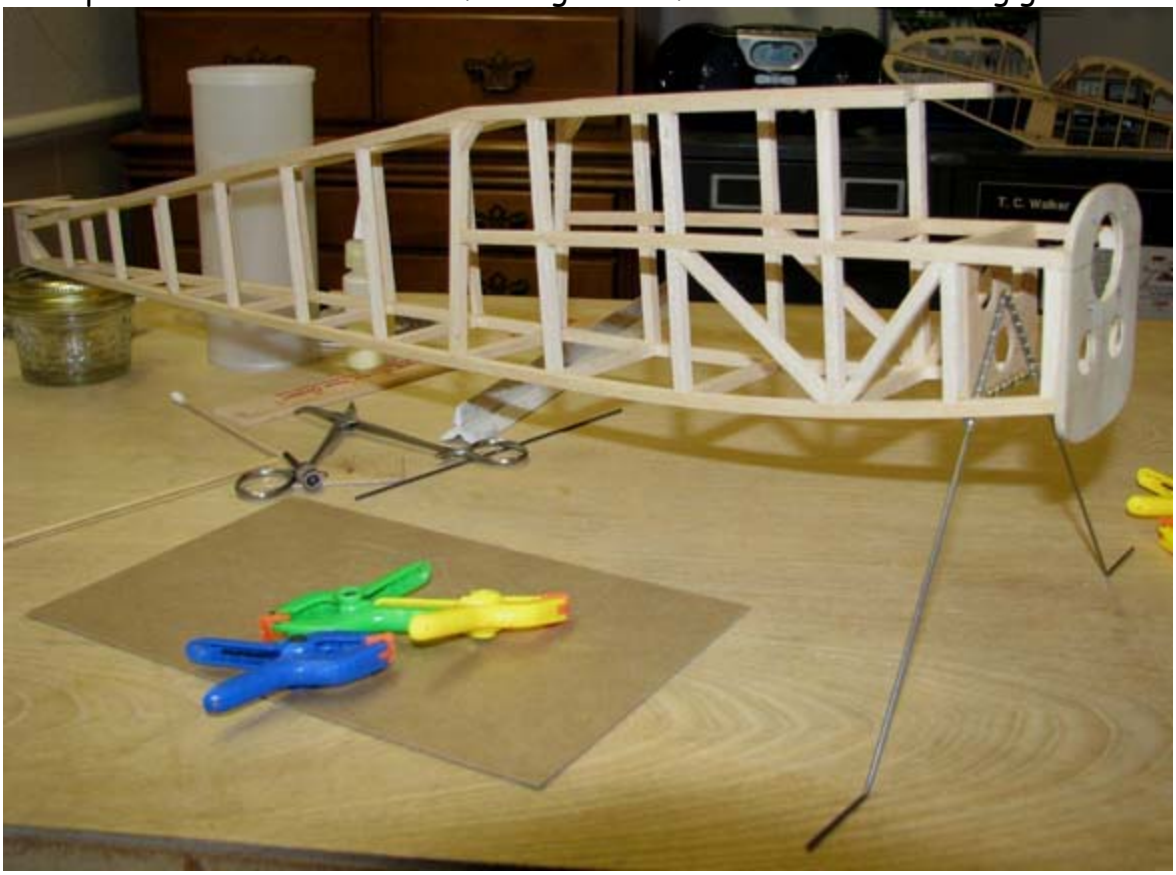
The edges of the landing gear's 1/16" plywood mounting plate were coated with aliphatic glue and then clamped into place on the fuselage main frame with seven plastic clamps as shown below.



Once the glue was dry, the clamps were removed leaving a very clean looking landing gear installation as shown below.



This last picture shows the entire fuselage main frame with the landing gear installed.



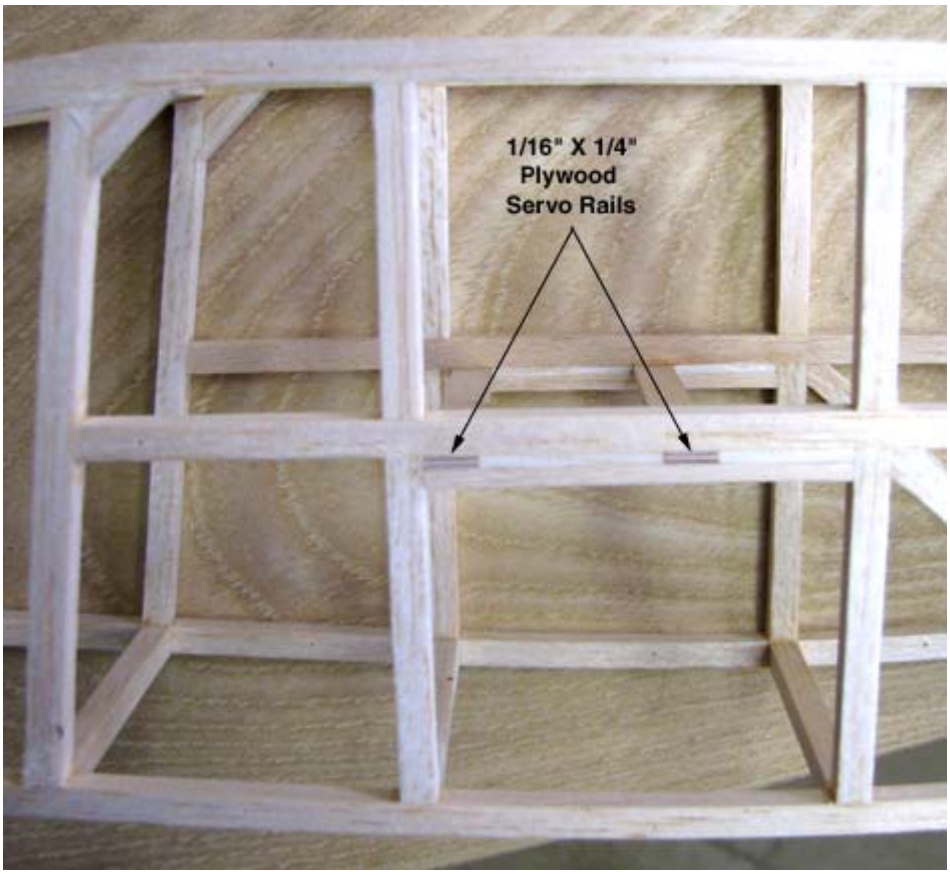
The next task will be to install the rudder and elevator servos. They will be placed as far back in the cabin area as possible and still be able to get to the servo mounting screws from the top opening over the cabin.....Tandy

David Harding

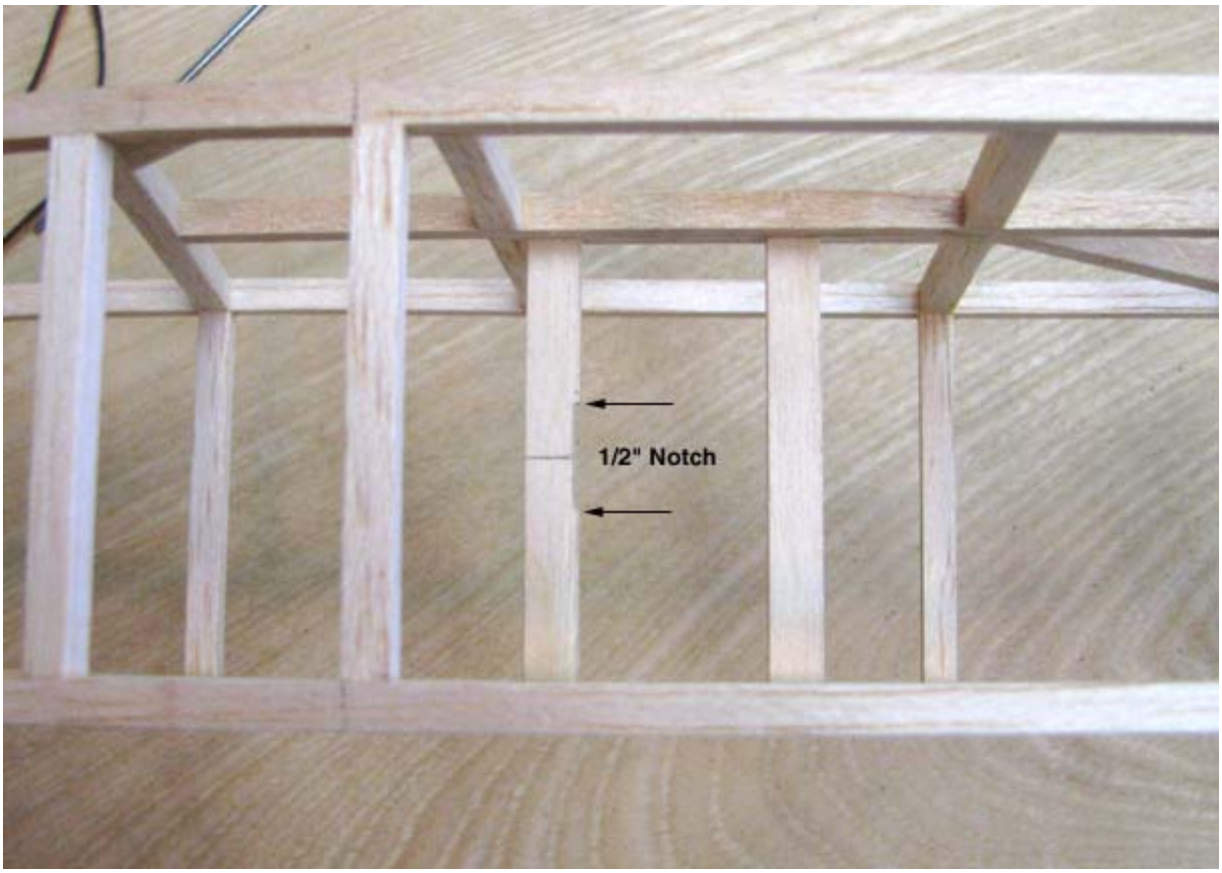
From: Tandy Walker [tandyw@flash.net]
Sent: Thursday, December 03, 2009 6:29 PM
To: Undisclosed-Recipient: ;@smtp105.sbc.mail.mud.yahoo.com
Subject: 25 Speed 400 Cloudster - Servo and Push Rod Installation

Speed 400 Cloudster Project

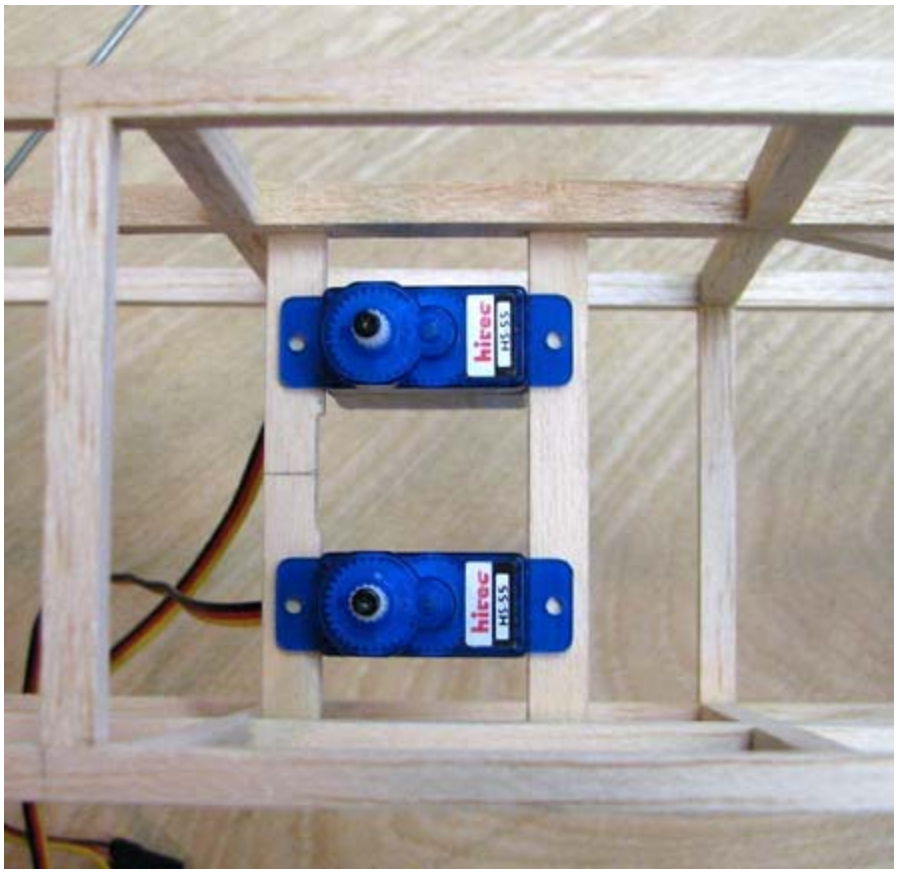
Looking in from the right side of the fuselage main frame, you can see the ends of two 1/16" X 1/4" plywood servo rail mounts secured in place with a sandwich structure.



Looking down from the top of the cabin, notice the 1/2" notch on the forward edge of the aft rail.

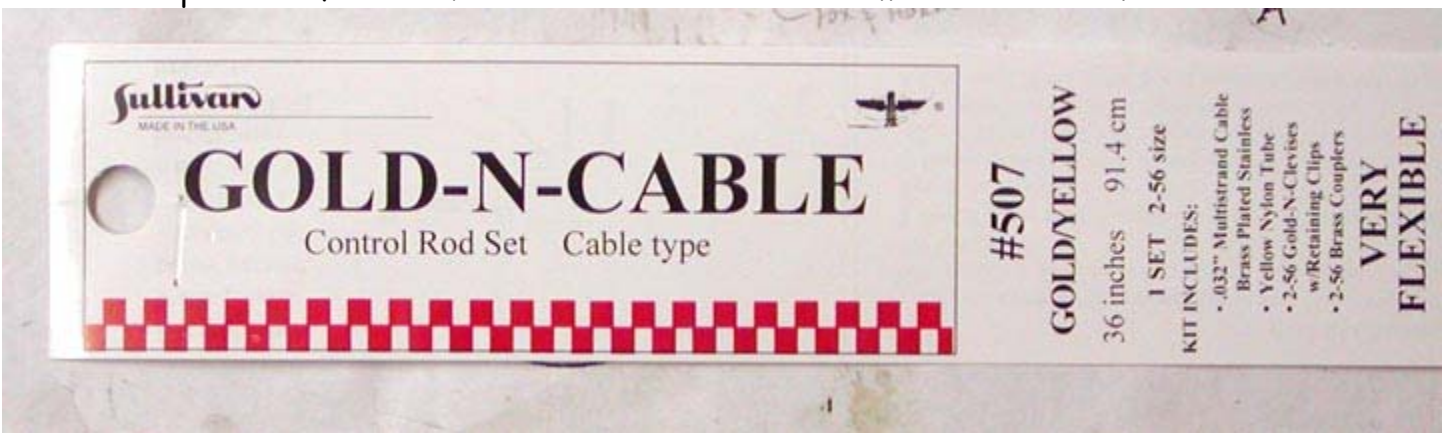


The small light weight Hitec HS-55 servos shown below were selected for use on the Cloudster. The servo rail mounts are placed to touch each end of the servo. Therefore, to remove the servo, they are slid over to the center where the notch is located, lifted up, and then tilted to get the servo out from between the rails. It is because the servo wire and connector prevents the servo from being lifted straight up out of the rails.

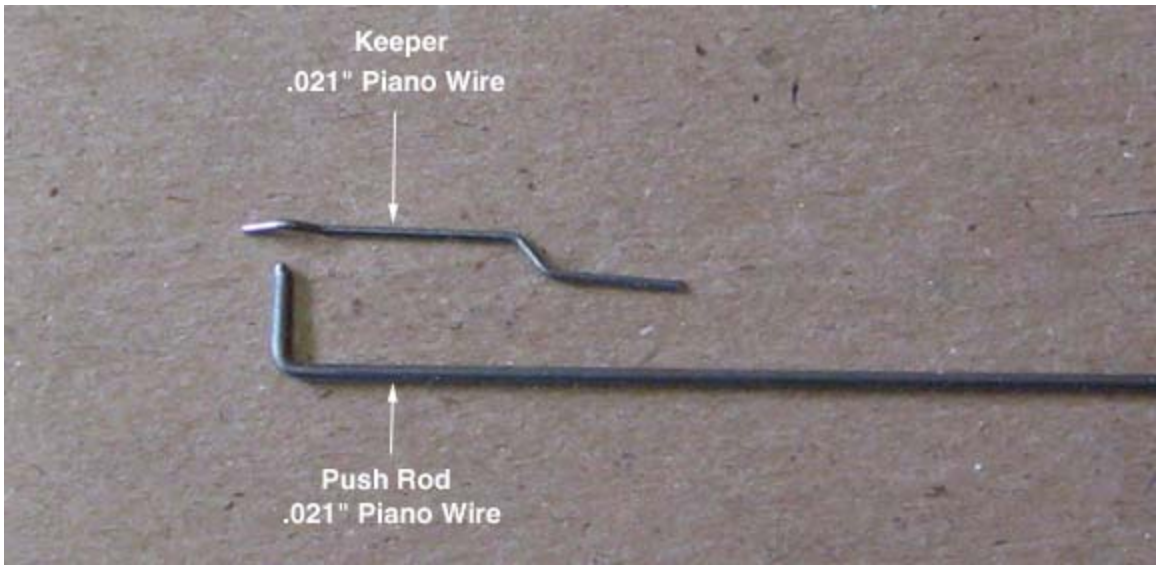


(Good Tip!)

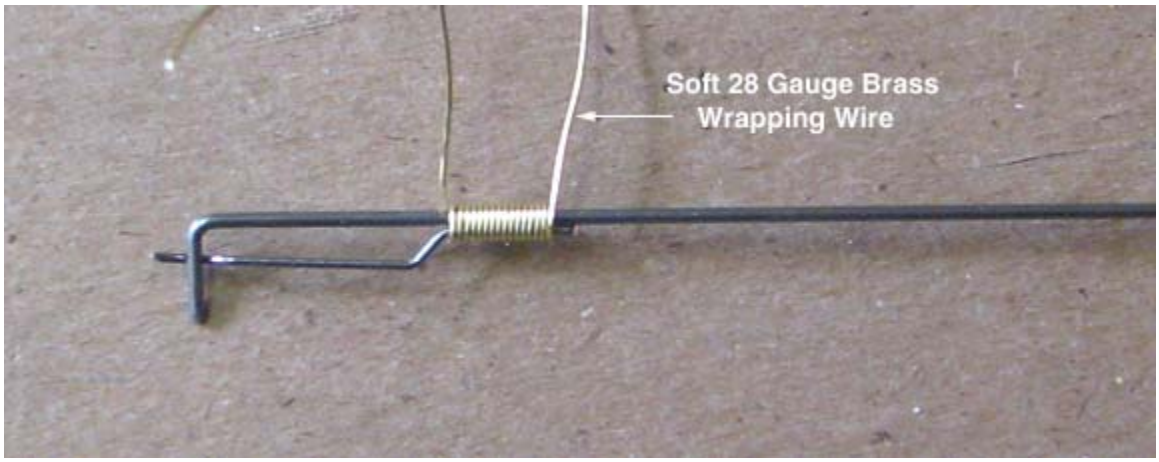
A very good friend of mine and outstanding model builder who won the SAM Championship several times, was Jim Reynolds of Universal City, Texas down by San Antonio. Jim, who is gone now, showed me how to make extremely light weight push rods, which I have used many time, using Sullivan's Gold-N-Cable #507 shown below. He told me to use the yellow sheath as the guide and substitute 1/32" piano wire as a push rod for the 1/32" stranded cable that comes with the set.



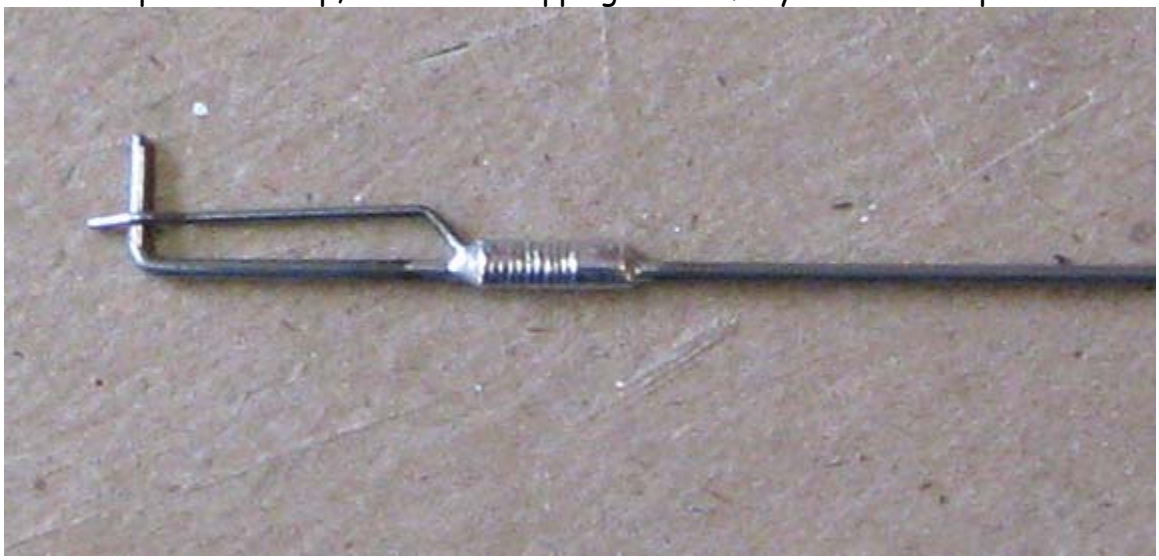
I came up with a neat little clip design to hold the 1/32" piano wire on the servo control arm that I will now describe using the picture below. A 90 degree bend is put on the end of the 1/32" (.032") wire to form a push rod post as shown on the bottom. The keeper, shown on top, is bent up out of .021" piano wire. Notice that the keeper has "V" bent on the end that fits up around the push rod post.



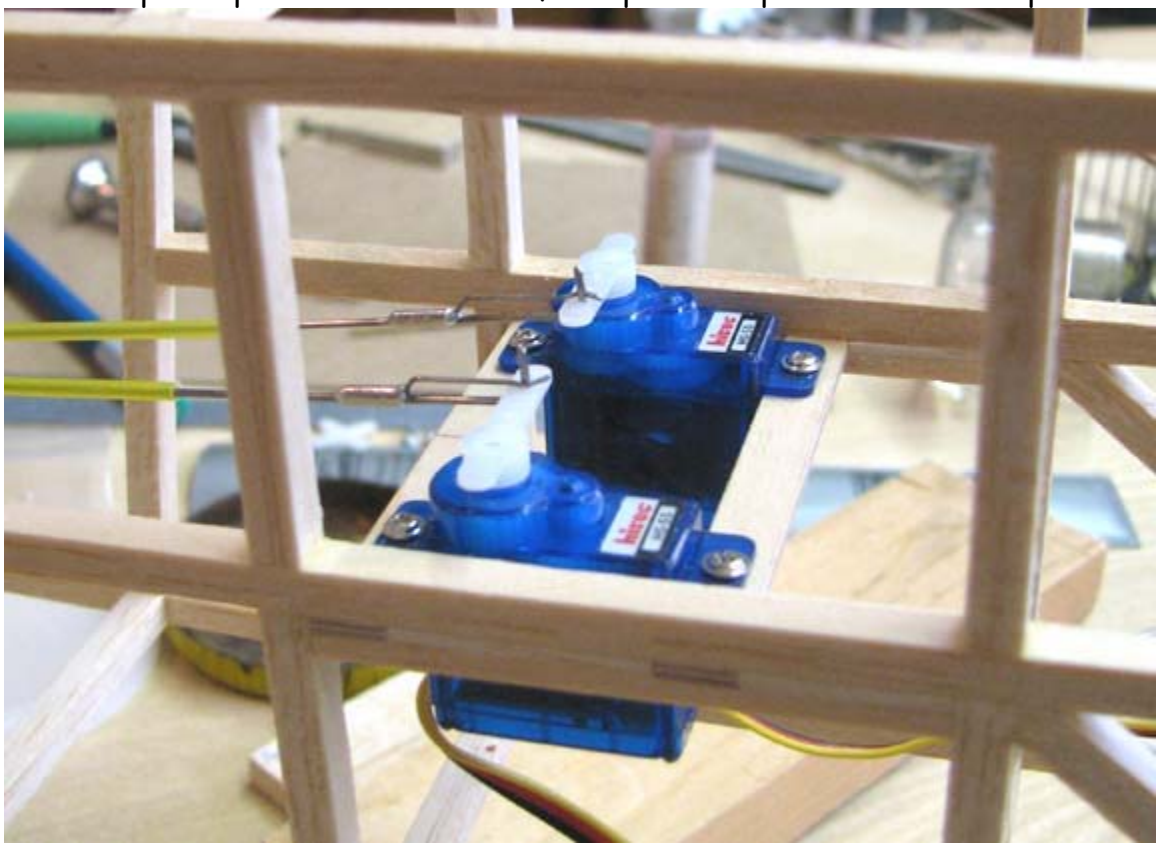
The keeper is attached to the push rod by wrapping the two together with soft 28 gauge brass wire as shown below.



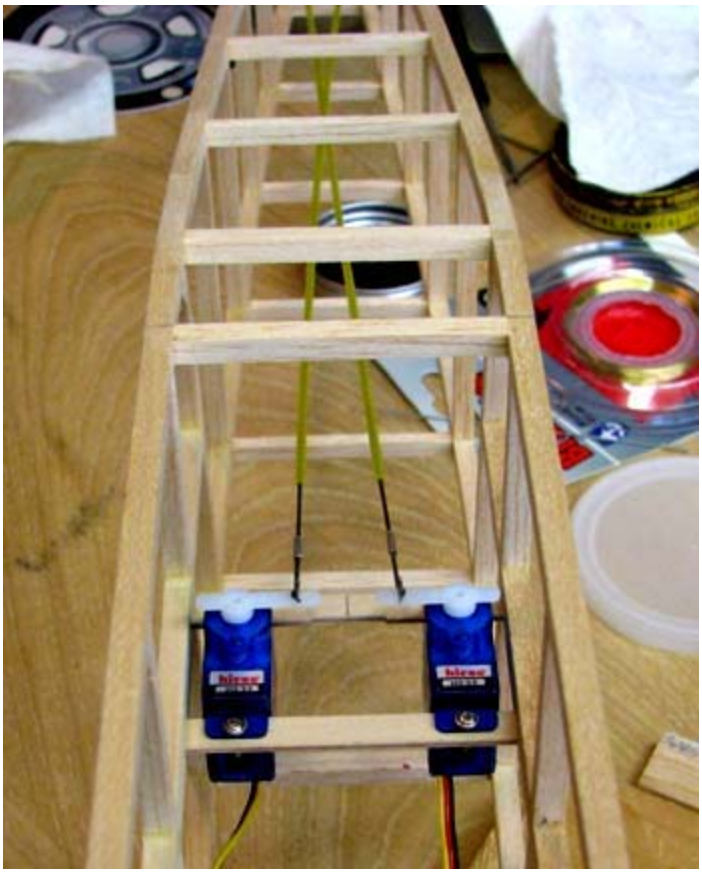
Care must be taken in getting the keeper properly aligned so that the V on the end engages the push rod post. Then to complete the clip, the wire wrapping is carefully soldered in place as shown below.



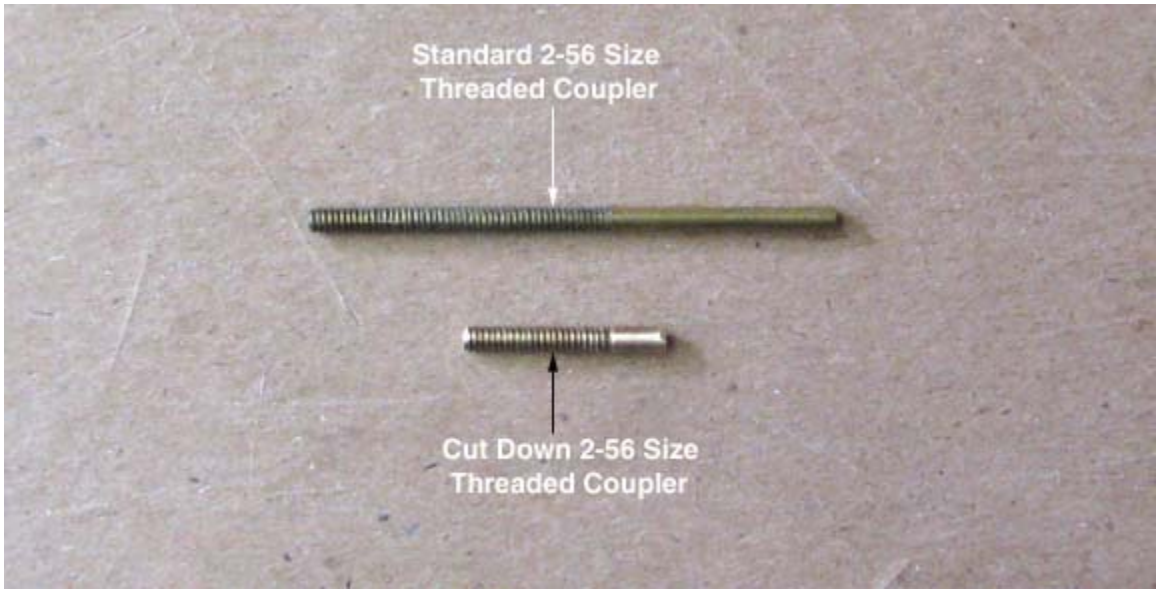
The two push rods are clipped onto the two control arms of the installed servos as shown below. Notice that the V keeper is place on the inside of the push rod post so it can not possible come off.



This picture shows how the push rods cross as they go back down the fuselage main frame in order to keep the push rods as straight as possible. To complete the push rod installation, both yellow sheaths must be braced (stabilized) at least every three inches. On the Cloudster, a brace will be added at every other station in the fuselage main frame.

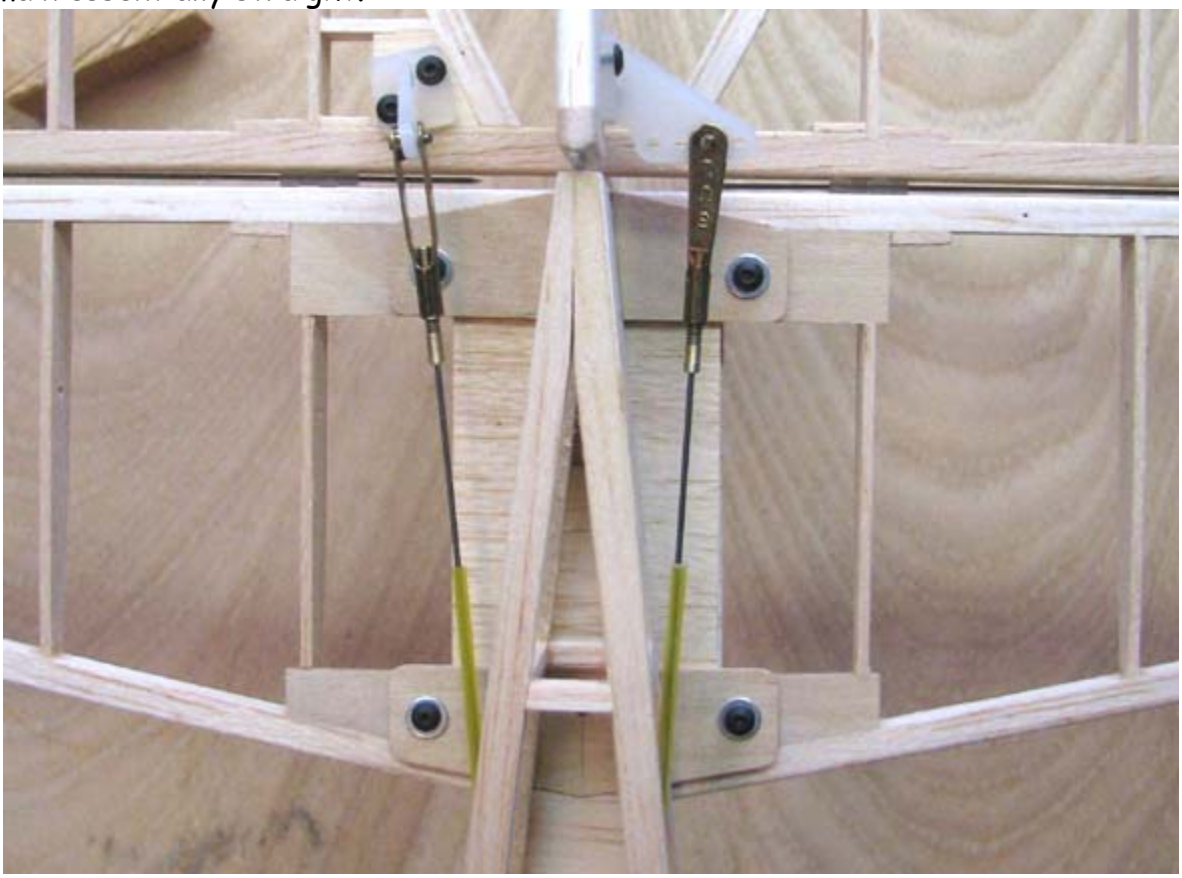


The 2-56 brass coupler for the Sullivan clevis comes much too long and heavy for this application. So as part of the Cloudster's on going weight saving effort, both ends of the coupler are removed using a Dremel cut off wheel. As you can see, the length and weight of the couple is cut in half as shown below. However, There are still enough threads on the short couple for two complete adjustment turns in either direction.

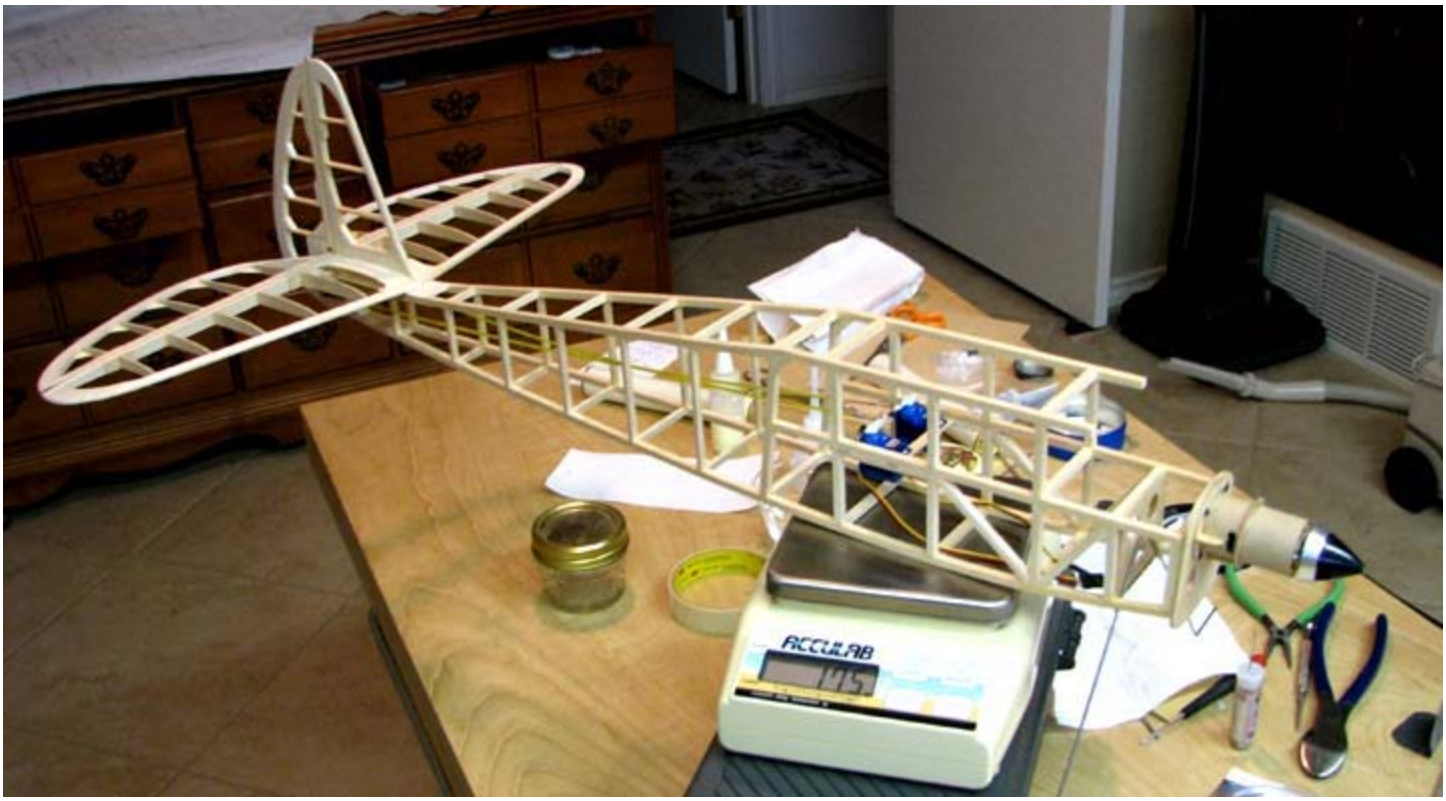


The picture below shows how the two push rods exit the aft end of the fuselage and attach to the

rudder and elevator control horns. You can see that by cross the push rods in the fuselage the push rods can remain essentially straight.



Before quitting for the day, the Speed 400 motor was mounted to the fuselage assembly which was weighted as shown below. The weight so far is now 175 grams (6.17 oz) and the model CG is still right where it should be.....Tandy

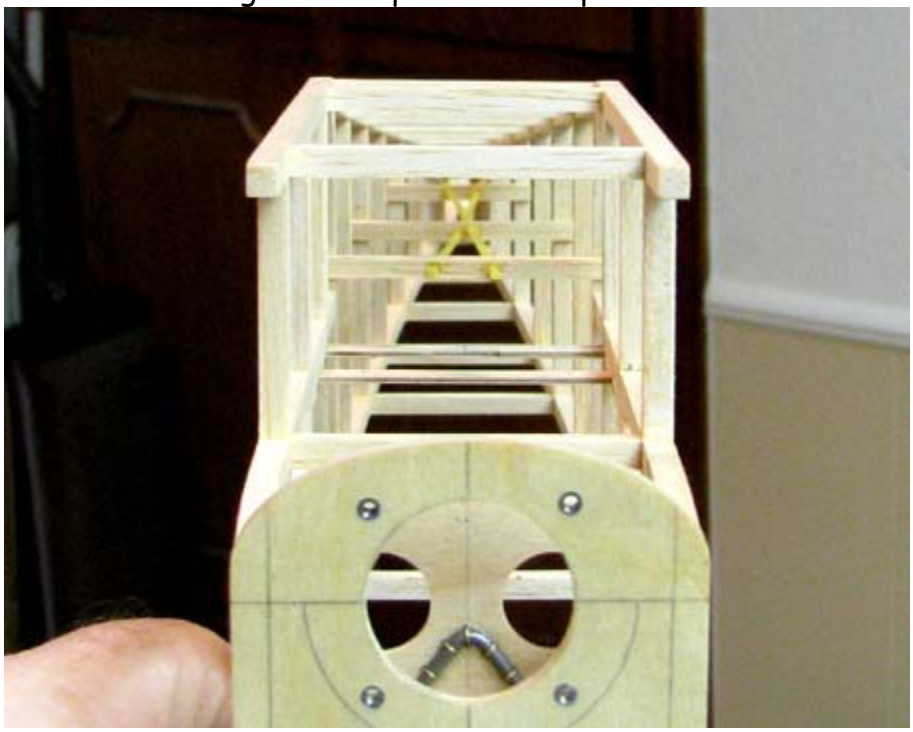

ACCULAB

David Harding

From: Tandy Walker [tandyw@flash.net]
Sent: Monday, December 07, 2009 8:03 PM
To: Undisclosed-Recipient: ;@smtp106.sbc.mail.mud.yahoo.com
Subject: 26 Speed 400 Cloudster - Stablizing the Push Rods

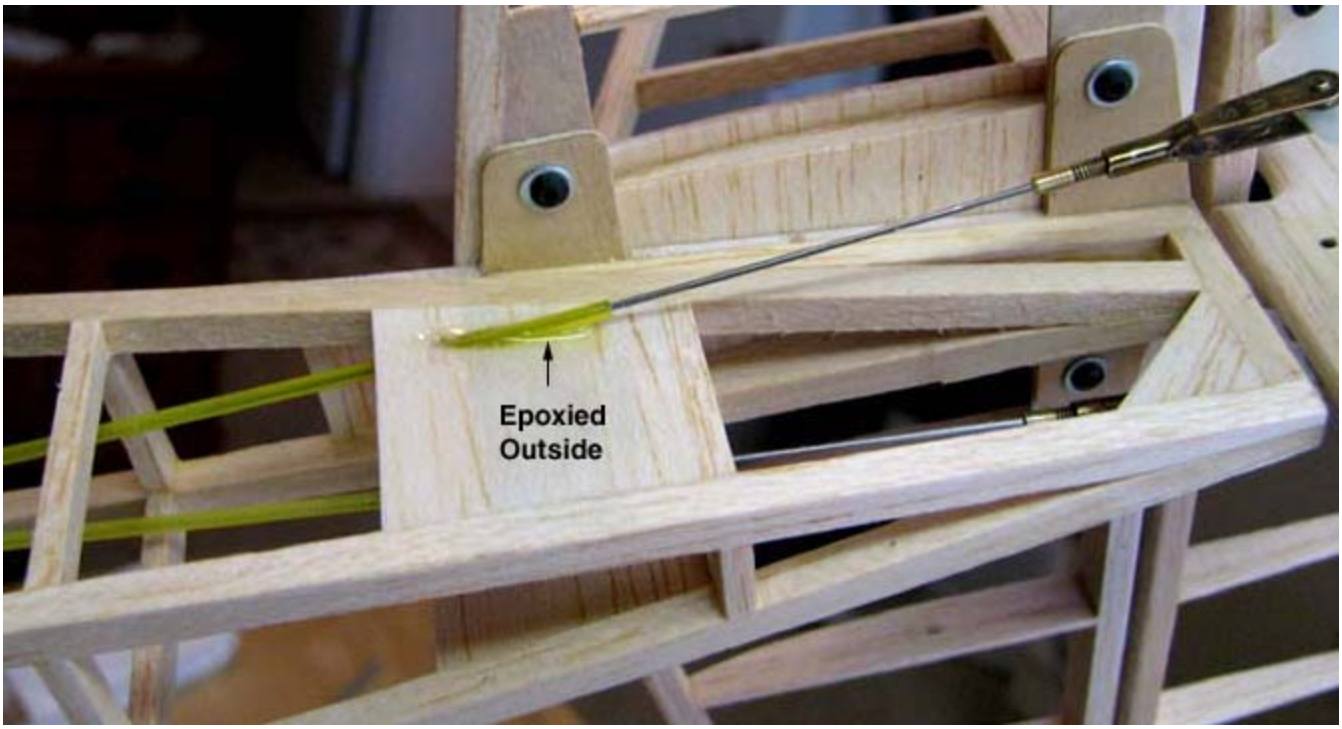
Speed 400 Cloudster Project

I have had little time to work on the Cloudster the last couple of days, however I did manage to get the rudder and elevator push rods stabilized and finished out today. In the front view of the fuselage below, you can see the three 1/16" X 3/16" balsa cross members holding the two push rods in position.

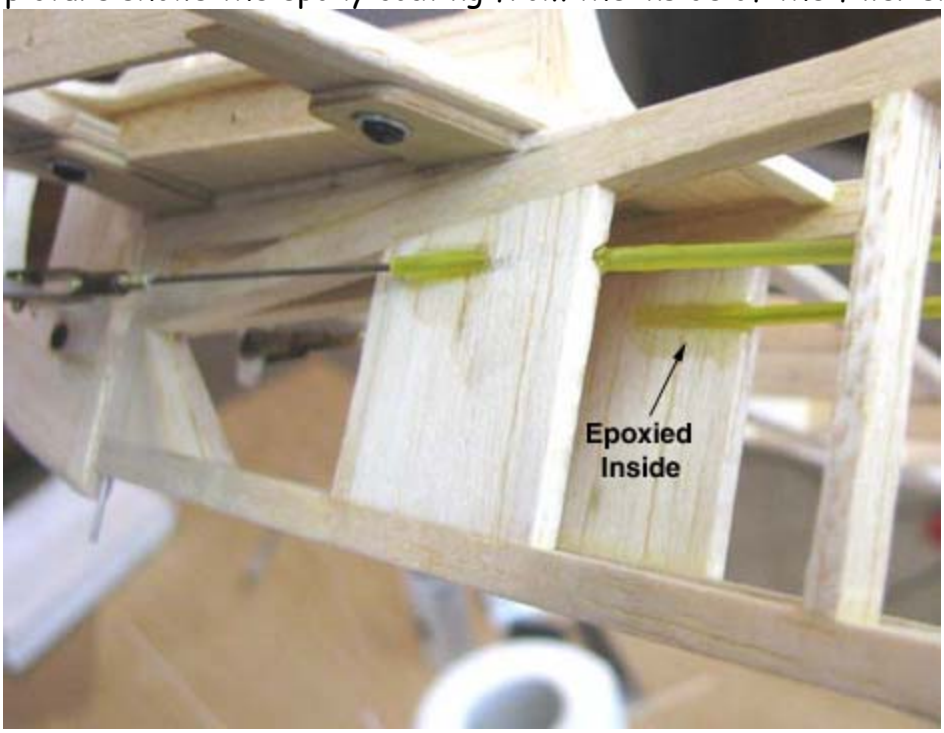


This is a different perspective of the cross members in this view looking in from the right side. The yellow sheaths have been sanded on the outside to scuff the exterior surface to enhance their CA bonding to the cross members.

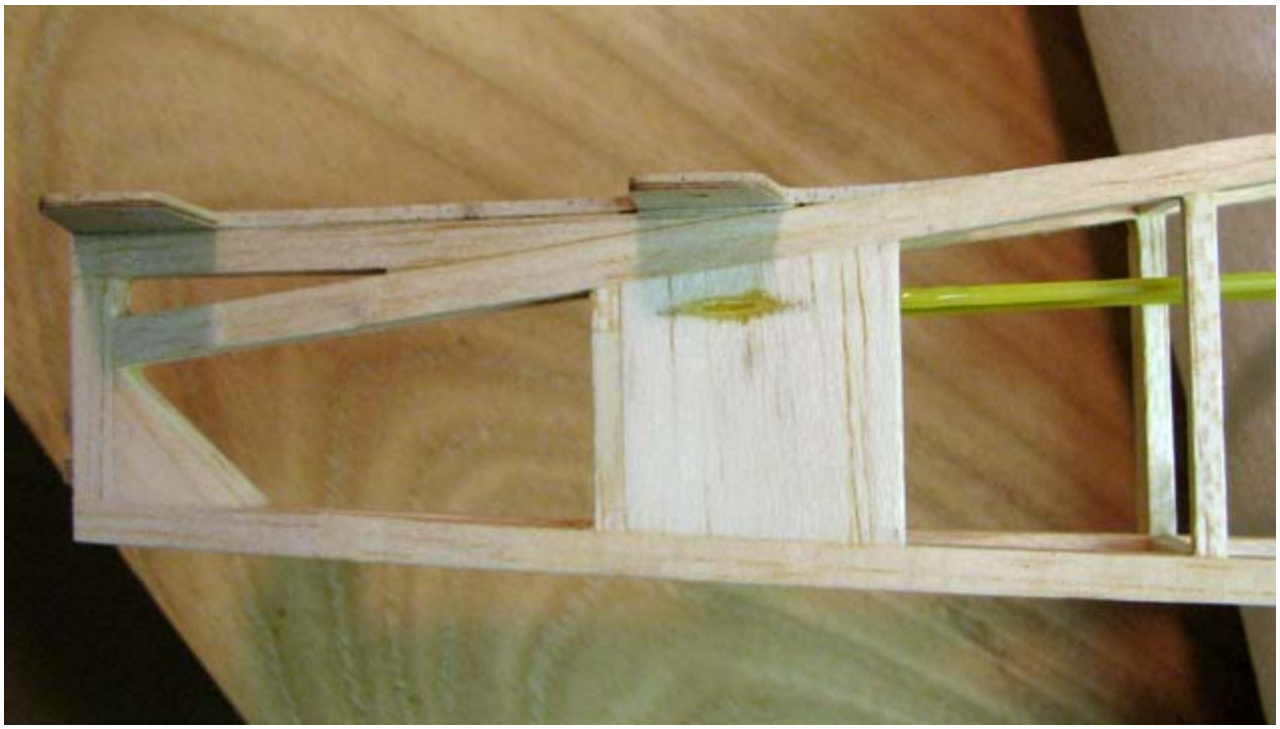
This picture shows the push rod exit at the rear of the fuselage where it emerges out of the 3/32" X 1-1/4" balsa filler sheet. The yellow sheath was extended out the back a little further than shown. 15 minute epoxy was then mixed up and the sheath was coated liberally on the outside and inside of the filler sheet with the epoxy. Then the sheath was both pulled back into filler sheet and rolled over and over at the same time to coat the inside of the exit joint. It is important that the push rod clevis be engaged in the control horn so that the yellow sheath angle is held in its proper position while the epoxy sets up.



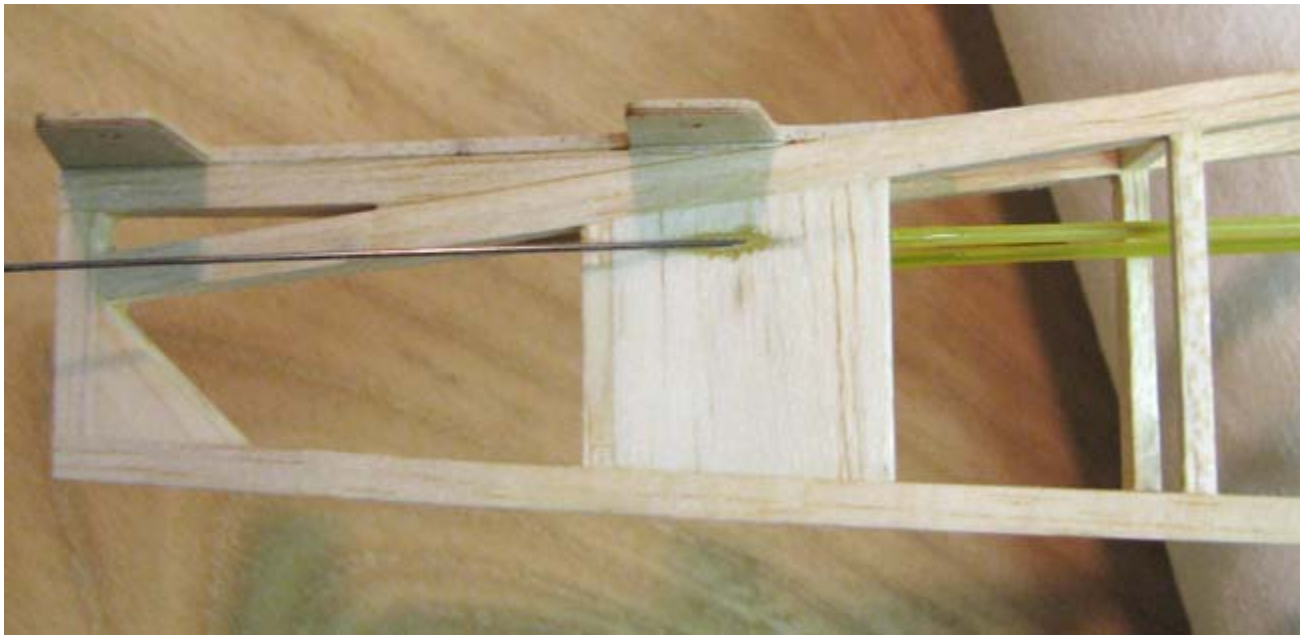
This picture shows the epoxy coating from the inside of the filler sheet.



Once the epoxy was thoroughly cured, the epoxied yellow sheath was coarsely ground down with a Dremel barrel sanding drum, but not too close to the filler sheet. Final sanding was done by hand, leaving a neatly inlaid elliptical opening flush with outside of the filler sheet as shown below.



This picture shows the clean exit of the 1/32" push rod out of the fuselage's side at just the right angle.



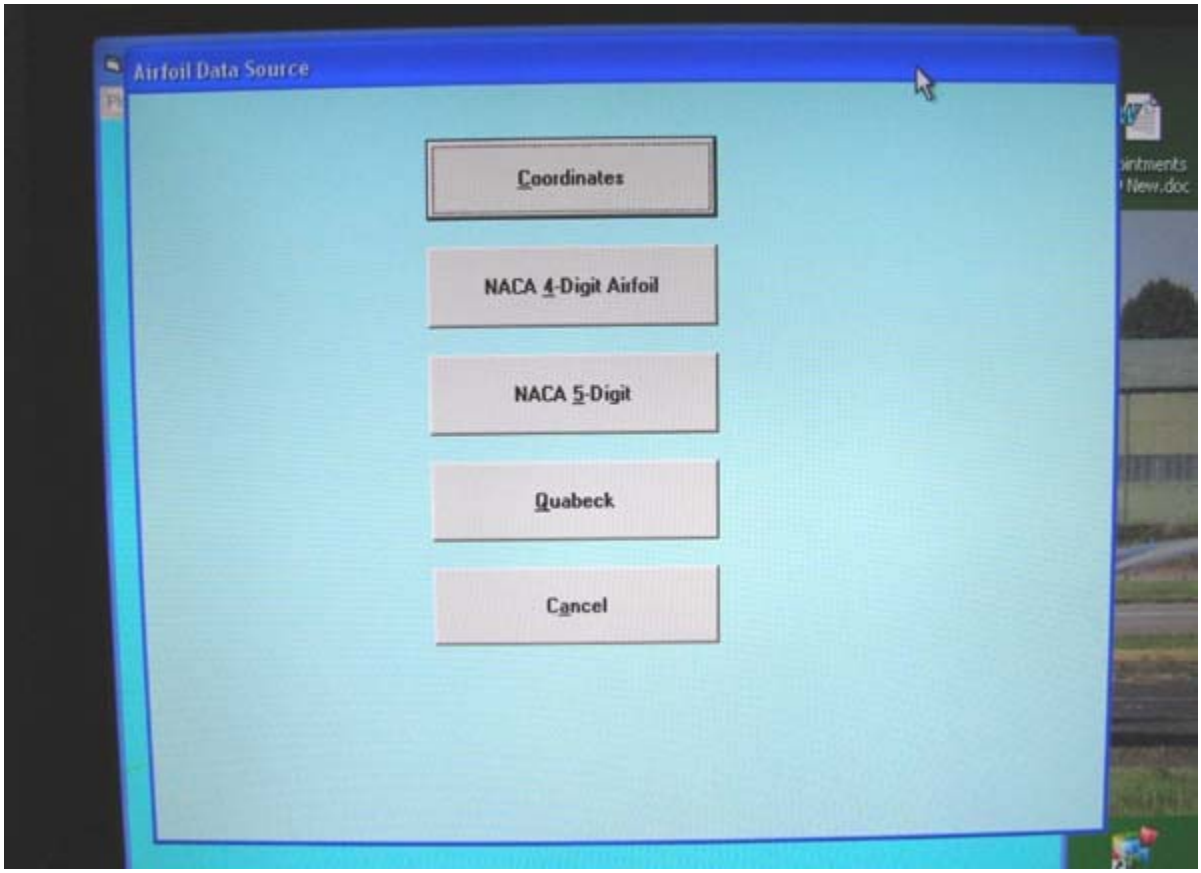
This completes the Cloudster's push rod installation. The next task will be to develop all of wing's rib and wing tip patterns in preparation for building the wing next.....Tandy

David Harding

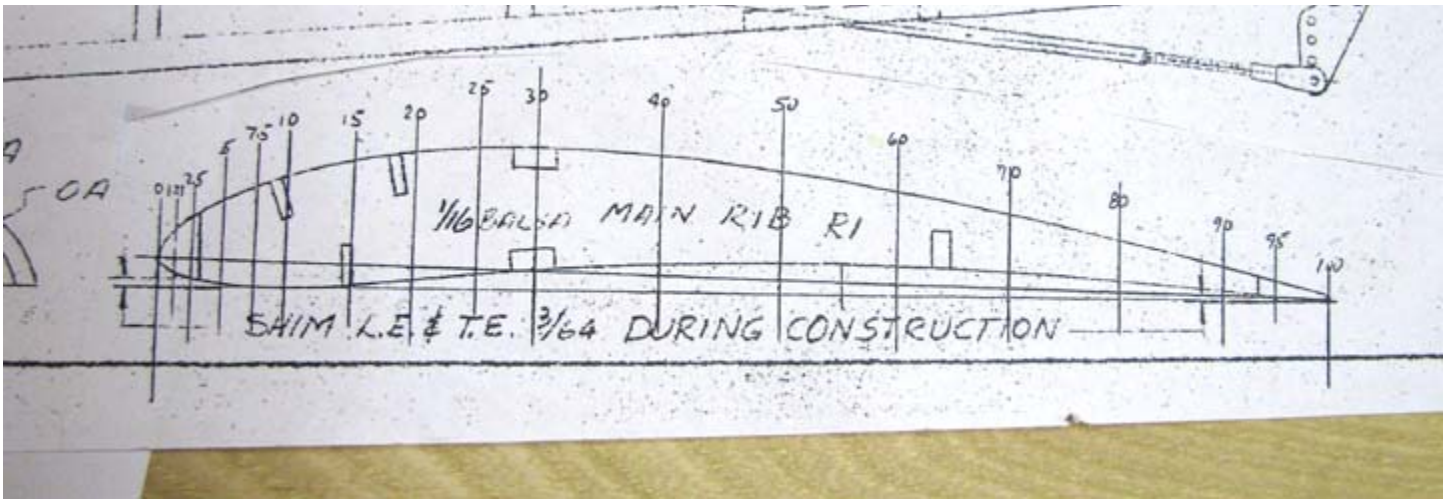
From: Tandy Walker [tandyw@flash.net]
Sent: Tuesday, December 08, 2009 11:56 PM
To: Undisclosed-Recipient: ;@smtp105.sbc.mail.mud.yahoo.com
Subject: 27 Speed 400 Cloudster - Wing Rib Patterns

Speed 400 Cloudster Project

A couple of years before Dick passed away, he had me get the "Airfoil 8" software program. Later, he gave me a cassette containing all of his empirical airfoil data of various models that he had developed and collected over the years. I loaded these data into the Airfoil 8 Program in the "Coordinates" option shown below. I had forgotten about this program because I had not used it for probably over ten years.

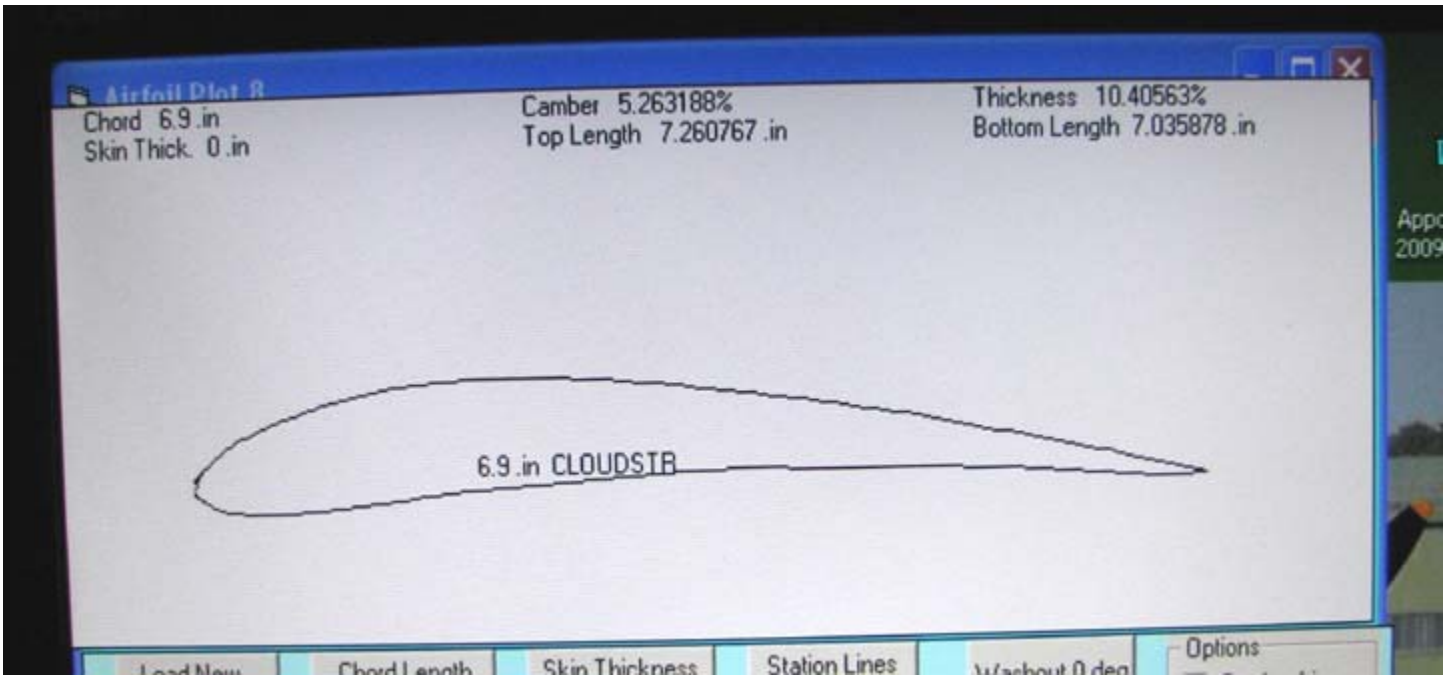


As I was preparing to develop the rib patterns for the Cloudster's wing, I noticed that the main rib R1 laid out in the bottom right corner of the Jim Adams plans as shown below. Rib stations in percent had been drawn on the R1 rib and I immediately recognized that it was Dick Huang's work from the hand printing. He obviously had measured and recorded the Coludster rib airfoil coordinates. Could it be I already had the Cloudster's wing airfoil coordinates loaded in the Airfoil 8 Program?

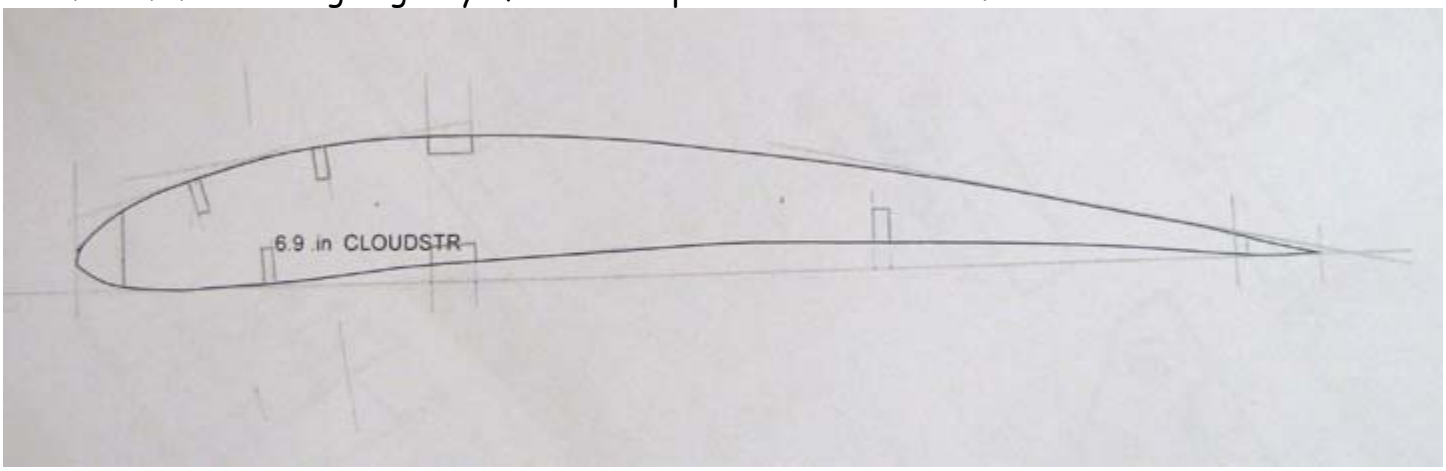


So I opened up the Coordinates option and sure enough, there was the data file for the Cloudster wing airfoil. It is called "CLOUDSTR.NOR" along with many of the other Old Timer model airfoils as shown below.

I clicked on CLOUDSTR.NOR and put in a chord length of 6.9". The Cloudster airfoil was displayed as shown below. The display is a little grainy, but the print out is smooth.



The full size Cloudster's airfoil was then printed out as shown below. I then made the R1 rib pattern by drawing in the LE, TE, and all of the spars. I checked the Cleveland Cloudster plans and the bottom of the 1/8" X 1/2" trailing edge lays flat on the plans as shown below.



So from this point on, it will be a simple matter to develop all of the Cloudster's wing rib patterns.....Tandy

David Harding

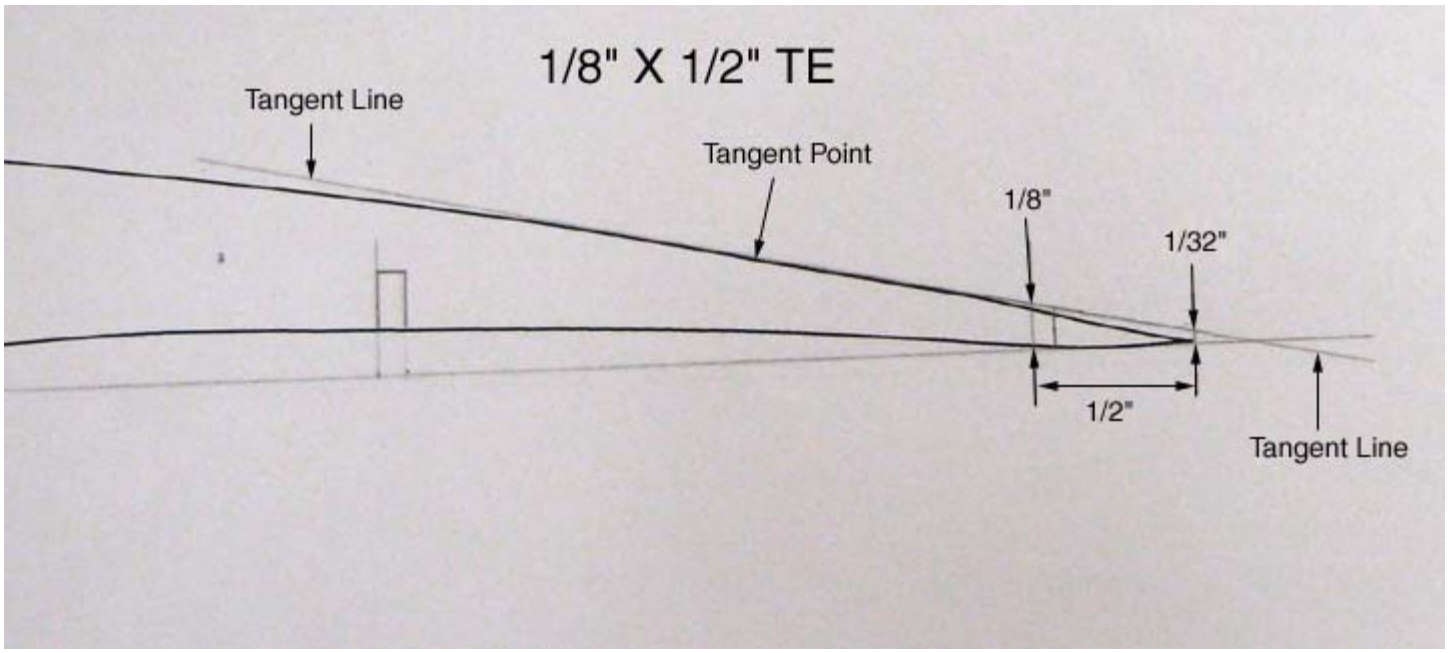
From: Tandy Walker [tandyw@flash.net]
Sent: Saturday, December 12, 2009 2:05 PM
To: Undisclosed-Recipient: ;@smtp103.sbc.mail.mud.yahoo.com
Subject: 28a Speed 400 Cloudster - Wing Tip Pieces and Wing Rib Patterns

Speed 400 Cloudster Project

I received an e-mail from Dave Harding last Friday with a very good method that he uses to account for wing rib finite trailing edge thickness when using an airfoil computer program. I feel it is worthwhile to pass his comments below along to you guys.....Tandy

----- Original Message -----

> **From:** David Harding
> **To:** 'Tandy Walker'
> **Sent:** Friday, December 11, 2009 10:32 AM
> **Subject:** RE: 28 Speed 400 Cloudster - Wing Tip Pieces and Wing Rib Patterns
>
> Hi Tandy, just wanted to share some experience I have found. When making wings the way you are, using an airfoil computer program you end up with ribs that only fit the true airfoil when the TE goes to a sharp edge; not a good thing structurally and hard to make too.
>
> I always lay out the rib and figure the increase in chord necessary to end up with the TE thickness I desire; maybe 1/32 for a small chord wing or even 1/16 for a bigger one. Then I draw, print and cut the ribs to the extended dimension but leave the TE in the same place as the original design. Then cut the TE to match the new dimensions in terms of thickness, at the rib interface and the desired final TE thickness. The chordwise dimension is unchanged from the original.
>
> If you don't do this but build with a finite TE thickness you have changed the shape of the airfoil at one of its critical locations.
>
> Dave
>
> Dave,
> The picture below shows what I did on the Cloudster rib pattern to account for the 1/32" trailing edge thickness. I drew in a 1/32" thickness at the end of the airfoil and then projected a line forward tangent line to the top of the airfoil contour. As you can clearly see for the Cloudster's airfoil profile, this represents only a small deviation to airfoil section, but a deviation never the less. You provided a very good input Dave and the kind I like to receive because I learned something (thank you). I never thought of developing a rib pattern as you described above, but I will use your method the next time I am developing a rib pattern.....Tandy

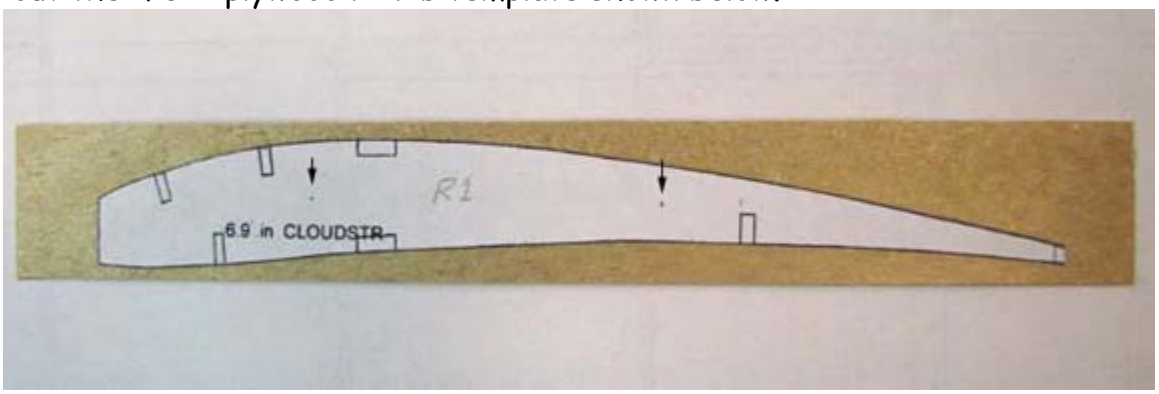

1/8" X 1/2" TE
Tangent Line
Tangent Point
1/8"
1/32"
1/2"
Tangent Line

David Harding

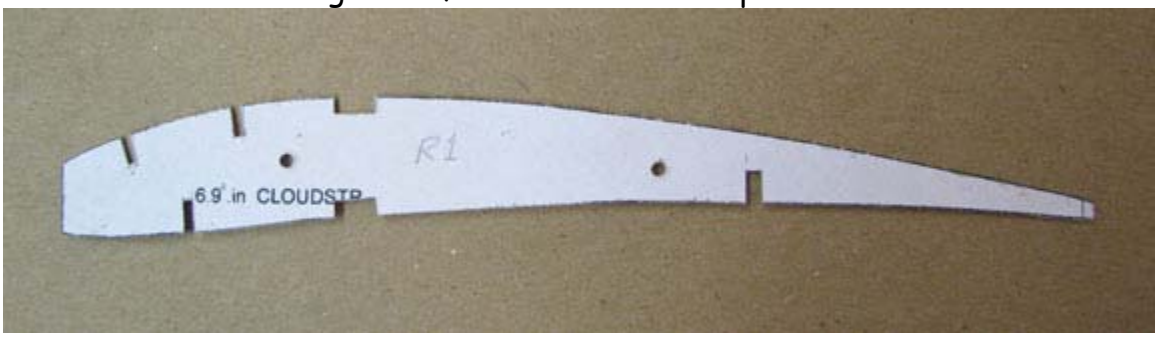
From: Tandy Walker [tandyw@flash.net]
Sent: Sunday, December 13, 2009 2:16 PM
To: Undisclosed-Recipient: ;@smtp105.sbc.mail.mud.yahoo.com
Subject: 29 Speed 400 Cloudster - Wing Ribs

Speed 400 Cloudster Project

In preparation for producing the Cloudster wing ribs, the next step was to first cut out the 1/32" plywood R1 rib template shown below.



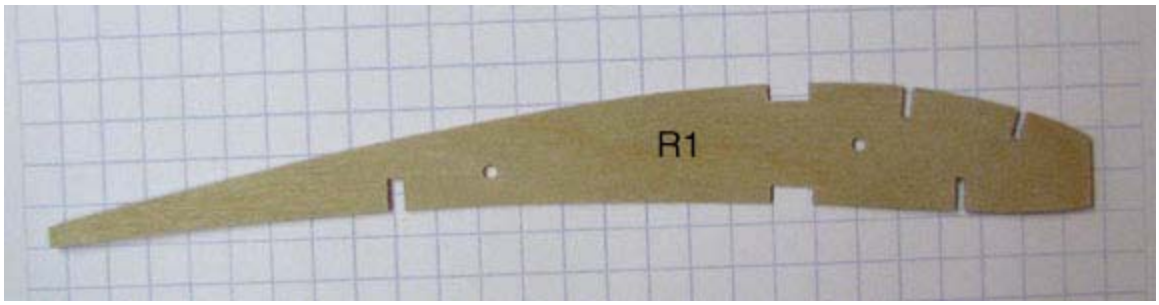
This included drilling the two alignment holes and carefully cutting out all of the spar notches and checking their fit with the actual spars selected as shown below.



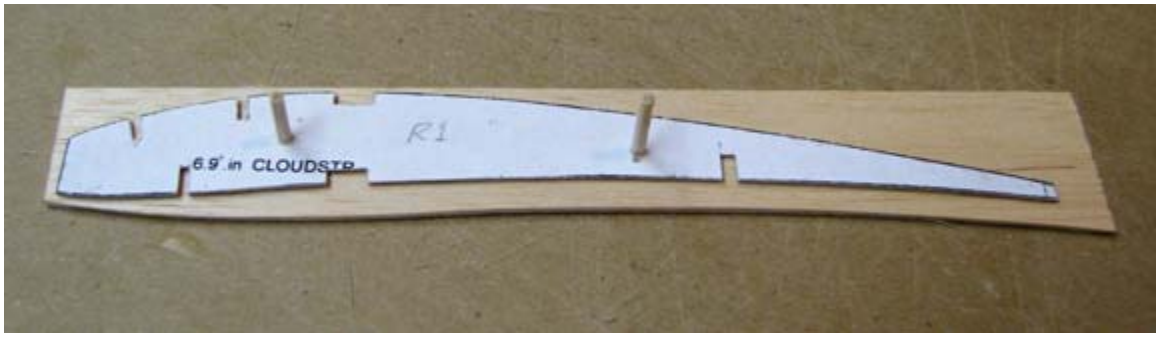
As part of the Cloudster's on going weight saving effort, the sizes of the spars were reduced as follow:

Main Spars	3/32" X 1/4"
Rear Spar	3/32" X 3/16"
Turbulator Spars	1/16" X 3/16"
Leading edge	1/4" X 1/2" ***(trimmed down later)***
Trailing Edge	1/8" X 1/2"

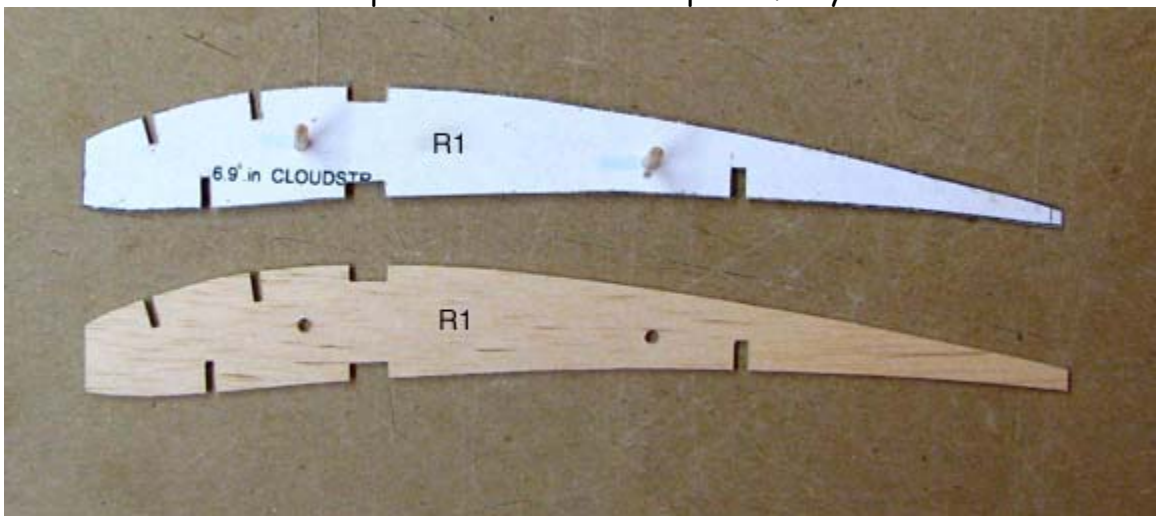
The sharpness of the plywood rib template is better seen from the back side as shown below.



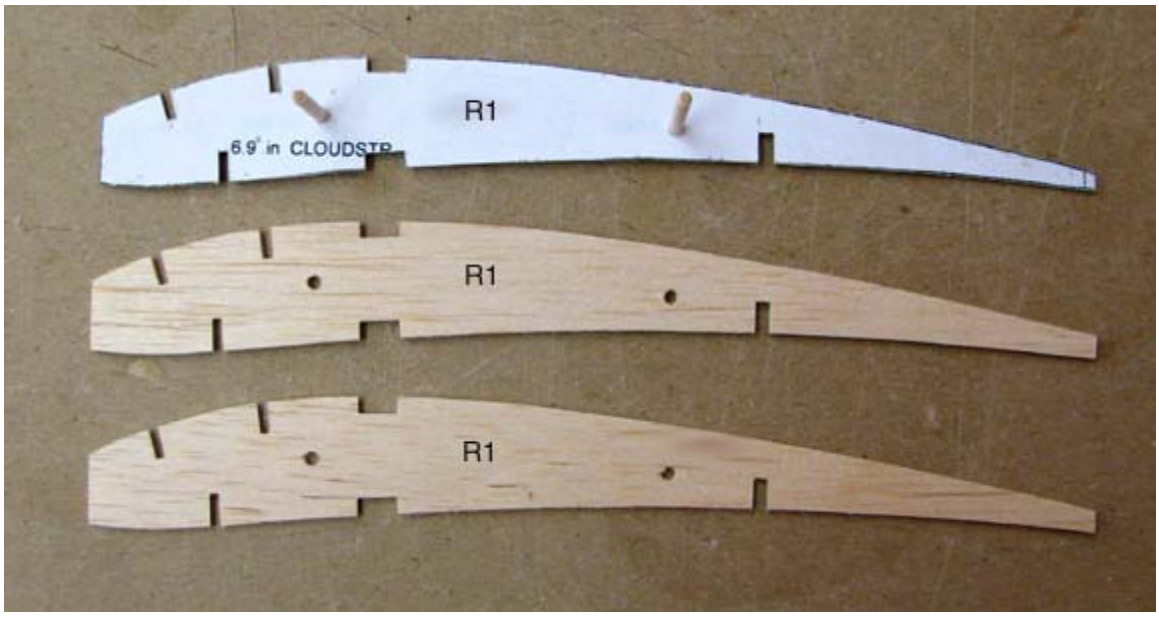
Two 1/16" alignment dowel pins were cut to length. The plywood template was placed over a sheet of medium 1/16" balsa and a No. 44 drill bit was twisted by hand through the template's alignment holes into the balsa sheet below. The alignment dowel pins were inserted through the holes pinning the template to the balsa sheet as shown below. It is to be noted that the forward hole and dowel was done first and then aft hole and dowel done second.



The first balsa rib was then cut out, notched, and sanded to shape while on the template. Then the near perfect R1 rib was removed and placed below the template for you to see below.



Just to illustrate the accuracy consistency of this method, the second R1 rib was cut out, notched, and sanded to shape. It was then placed below the first R1 rib as shown below. I know some model builders make a complete stack of wing ribs at one time using a band saw. However, for me, maintaining this kind of accuracy in balsa can only be done one rib at a time using the template method.



This process will now be repeated over and over for a day or so until all of the Cloudster ribs have been made.....Tandy

David Harding

From: Tandy Walker [tandyw@flash.net]
Sent: Monday, December 14, 2009 11:46 AM
To: Undisclosed-Recipient: ;@smtp104.sbc.mail.mud.yahoo.com
Subject: 30 Speed 400 Cloudster - Method for Notching Wing Ribs

Speed 400 Cloudster Project

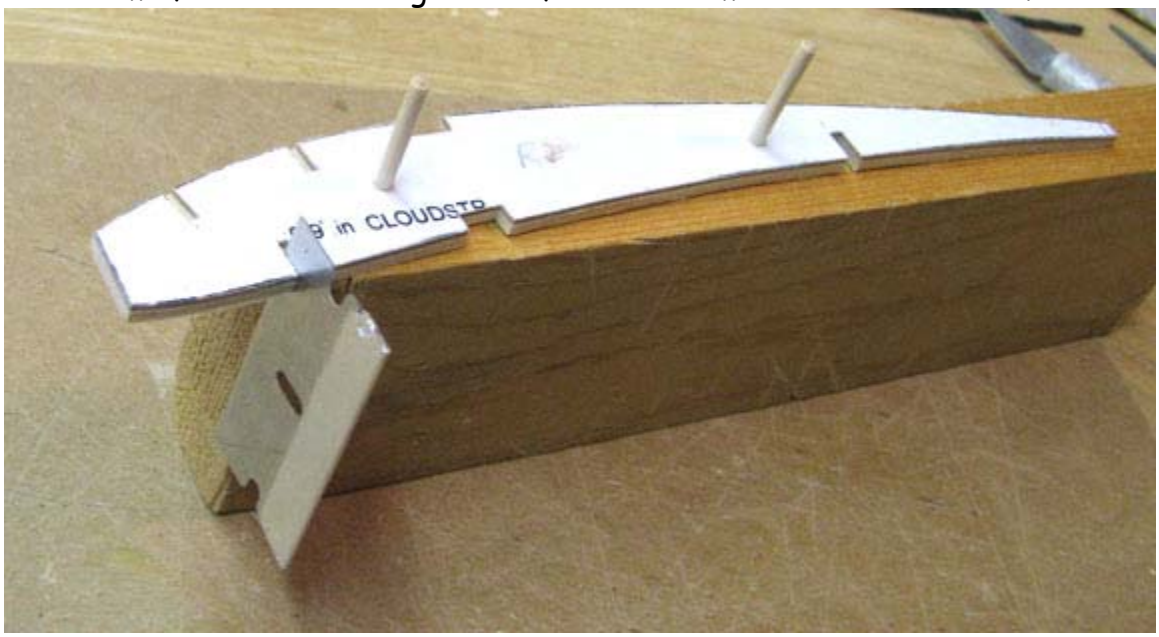
I know that many of you are seasoned modelers and build equally as well or better than I, so some of the material I report on seems rudimentary and too tutorial for most you. However, I had a response from a particular modeler indicating he was having trouble cutting accurate notches in his wing ribs and wanted to know how I do it. So I decided to make the answer to his question one of my Cloudster reports.

We all have specific tools for specific jobs that work best for each of us. Balsa can be a difficult wood to cut because it tends to crush along the cut if the blade you are using isn't extremely sharp. Throughout my many years of modeling I found that there is only one brand single edge razor blade that has an exceptional edge sharpness that approaches surgical steel. It is the "GEM" single edge razor blade by Personna shown below. These blades are sometimes hard to find, but here in North Texas Walgreen's drug stores do carry them and they are expensive at $5.15 for package of 10 blades. However, I never use any razor blade but the GEM when I am building models.

The collection of tools I use for cutting out notches in 1/16" balsa wing ribs are shown below as follows: (1) the knife is used for cutting out the bottom of notches because the razor blade will not work, (2) The GEM razor blade, (3) a small flat file with a thickness just under 1/16" ***(probably 3/64")***, and (4) a 6" flat file with a

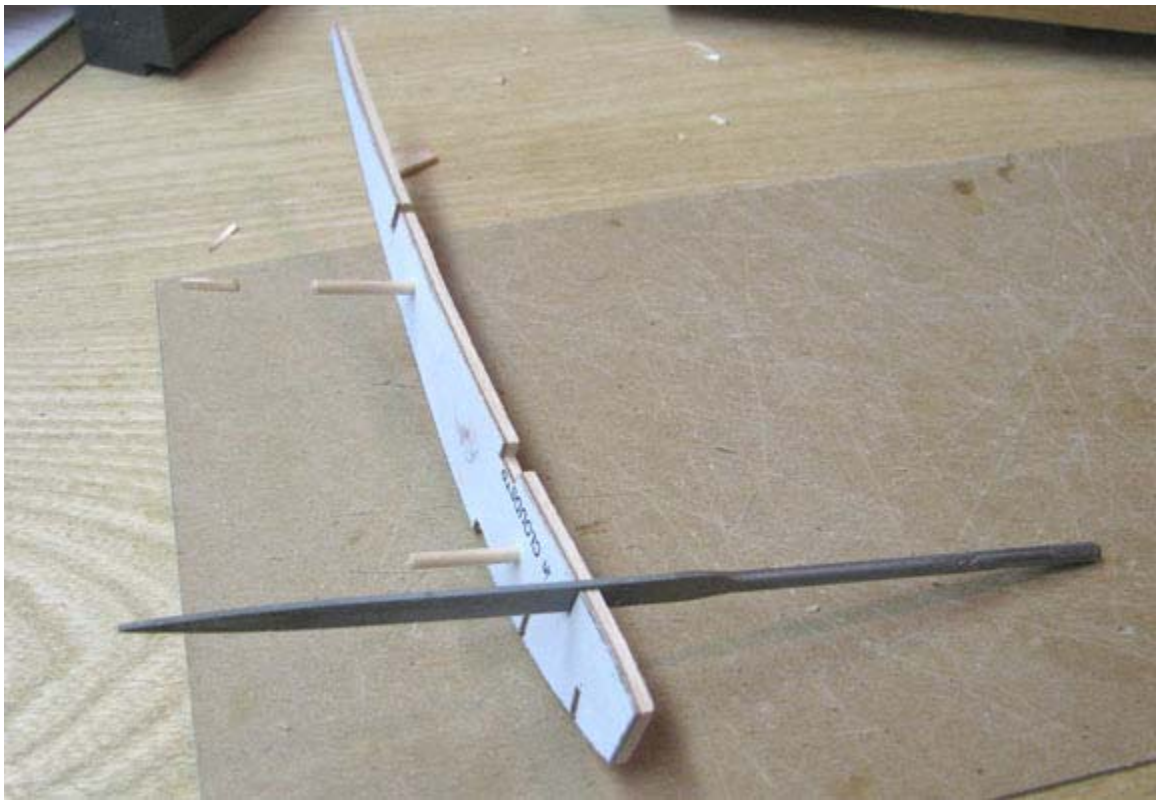
thickness just under 3/32".

Using one of the 1/16" X 3/16" notches as an example, the procedure is to first carefully cut down the template notch sides with the razor blade as shown below, cutting a little at a time on each side until you have reached the depth of the notch. Do not worry about the squareness of your cut at this point, in fact it is better to have the blade tilted slightly to the inside of the notch. Use the knife to cut across the bottom of the notch and get rid of the balsa material in the notch.

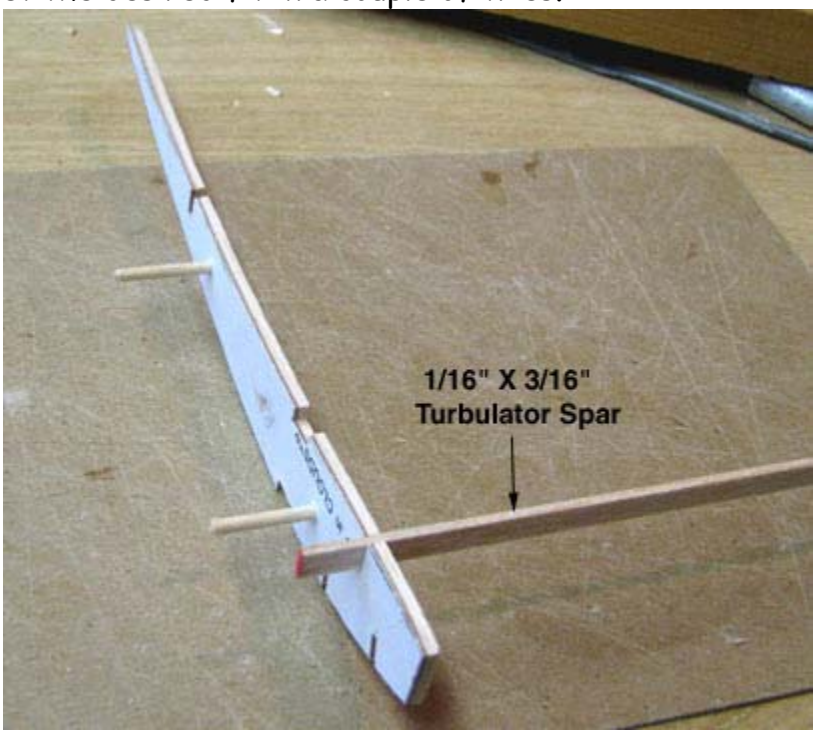


Now, using the small flat file, carefully square up the edge cuts of the notch a little at a time as shown below, which opens up the width of the notch. Do not try to reach the final width on the first filing. By the way, the 6" file is used to square up the edged of the 3/32" X 3/16" notch at the rear of the rib

seen below.



Using the 1/16" X 3/16" balsa spar stock, check the tightness of spar in the notch as shown below. Then go back with the file and widen the notch just slightly. This is an iterative process, but with a little practice, you can get the desired fit in a couple of tries.



Some of you will think this is simply too much work for just notching out a rib. However, we are all