

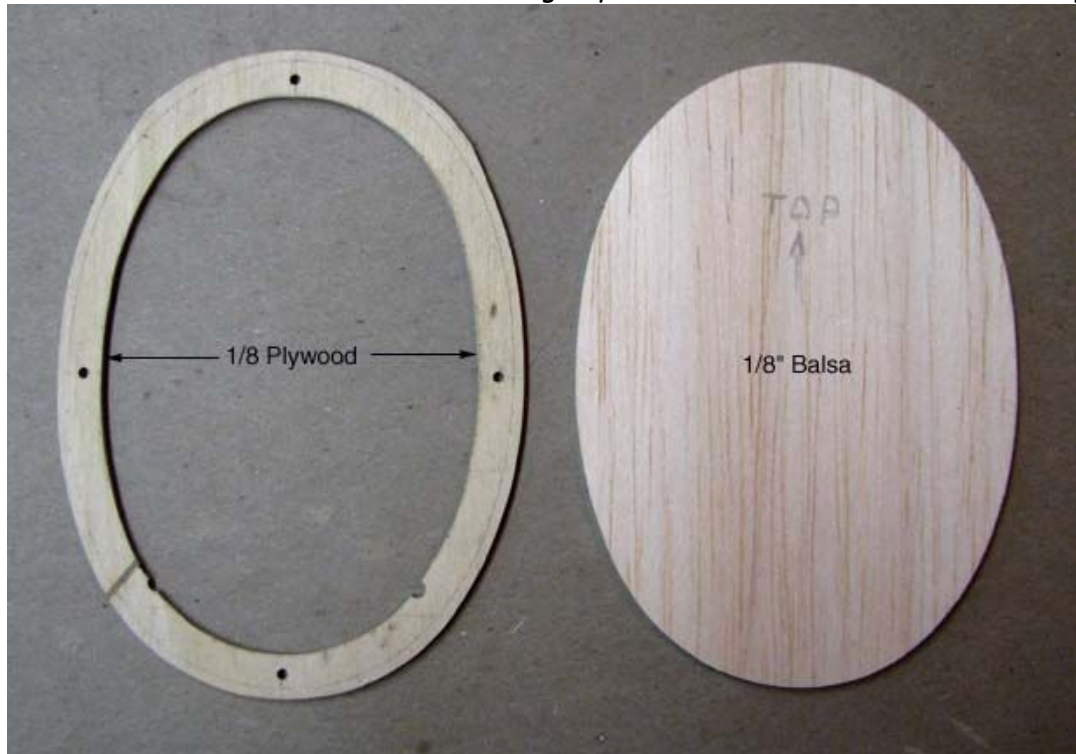
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Date: 3/20/2009 9:29:20 AM

Subject: 59 Sailplane Making up the Cowl Jig Fixture

After a fair amount of thought and planning, I have begun construction on a jig fixture for building the McCoy 60's cowl for the Sailplane. The approach actually involves making the rear cowl bulkhead that fit flush up against the firewall as well a forward cowl bulkhead that the cowl's outer nose ring will glue to. In the picture below, the rear cowl bulkhead is a combination of an 1/8" plywood ring with four 3/32" alignment holes and an 1/8" balsa bulkhead overlay that the planking will rest on. Notice the pencil line around the plywood ring on the left that is set inside the outer edge by 3/32", the thickness of the outer planking.



The 1/8" balsa bulkhead is overlaid and glued onto the plywood ring coincident with pencil line around the outer edge as shown below.



Then the interior of the 1/8" balsa bulkhead is completely cut out and sanded flush with the inside of the plywood ring as shown below. To complete the rear cowl bulkhead, the four 3/32" alignment holes were drilled out as shown.



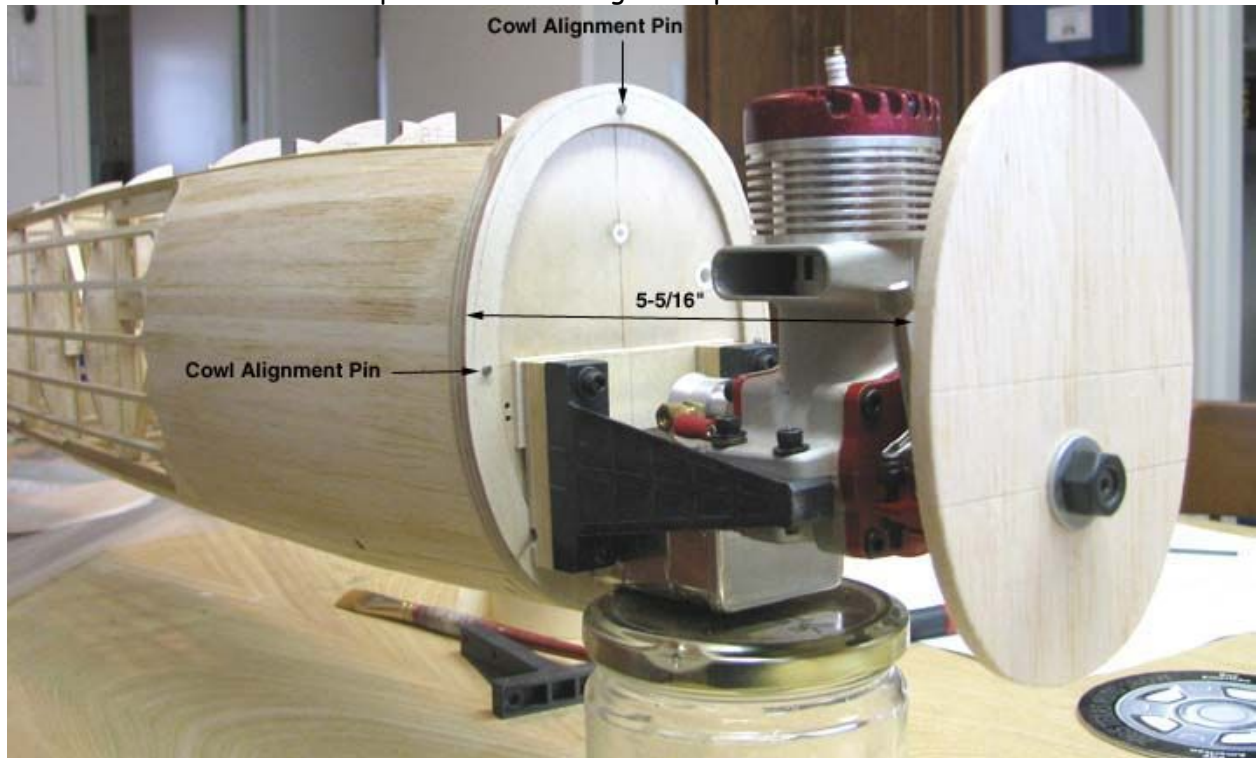
There was no forward cowl bulkhead drawing on the plans. However, the height of the forward cowl bulkhead is shown on the Comet plans to be 4.8". I drew in my thrust line to locate it on the bulkhead's vertical axis. I calculated the ratio of the semi-minor axis to semi-major axis of the rear cowl bulkhead (same as the firewall) to be 0.719. Using the 2.4" (4.8/2) as the semi-major axis of the forward cowl bulkhead, I calculated the semi-minor axis to be 1.73" (0.719 X 2.4). Then using the equation of an ellipse, I calculated the coordinates shown below for the forward cowl bulkhead contour. These were used to graph the (1) contour shown below. A template (2) was made, and then the actual forward cowl bulkhead (3) was cut out of 3/16" balsa sheet. It will remain solid until the cowl planking is complete and then its interior will also be cut out.

Forward Bulkhead							
x	y	a	b	Sq Rt	x	y	
0.00	0.00	7.75	1.00	1.00	2.00	0.00	2.00
0.25	0.06		0.98	1.00	1.99	0.20	1.98
0.50	0.12		0.97	0.98	1.97	0.50	1.97
0.75	0.18		0.93	0.96	1.93	0.75	1.93
1.00	0.24		0.87	0.93	1.87	1.00	1.87
1.25	0.30		0.80	0.89	1.79	1.25	1.79
1.50	0.36		0.71	0.84	1.68	1.50	1.68
1.75	0.42		0.60	0.78	1.55	1.75	1.55
2.00	0.48		0.48	0.69	1.39	2.00	1.39
2.25	0.54		0.35	0.59	1.17	2.25	1.17
2.50	0.60		0.25	0.50	1.01	2.40	0.88
2.75	0.66		0.18	0.44	0.86	2.50	0.71
3.00	0.72		0.13	0.38	0.71	2.58	0.55
3.25	0.78		0.00	0.00	0.00	2.40	0.00

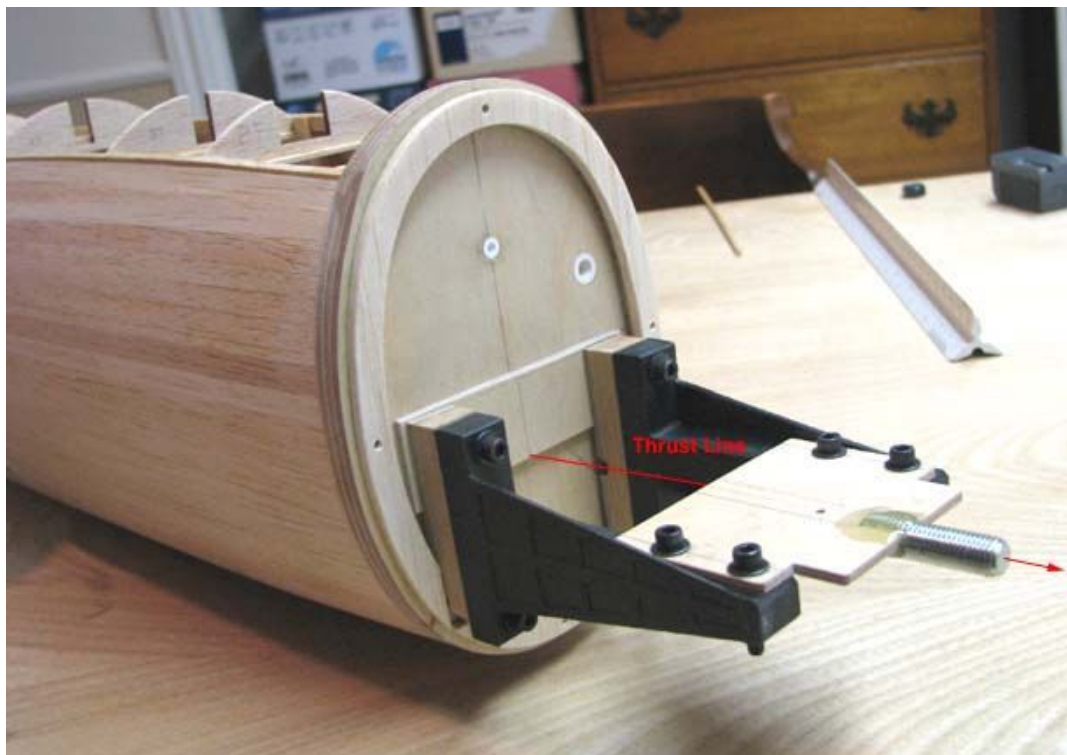
Rear Bulkhead							
x	y	a	b	Sq Rt	x	y	
0.00	0.00	8.75	1.00	1.00	1.73	0.00	1.73
0.25	0.06		0.99	0.99	1.72	0.25	1.72
0.50	0.12		0.96	0.96	1.69	0.50	1.69
0.75	0.18		0.90	0.90	1.64	0.75	1.64
1.00	0.24		0.83	0.83	1.57	1.00	1.57
1.25	0.30		0.73	0.85	1.48	1.25	1.48
1.50	0.36		0.61	0.78	1.35	1.50	1.35
1.75	0.42		0.47	0.68	1.18	1.75	1.18
2.00	0.48		0.34	0.58	1.14	1.80	1.14
2.25	0.54		0.24	0.50	1.08	1.90	1.06
2.50	0.60		0.17	0.41	0.96	2.00	0.96
2.75	0.66		0.11	0.34	0.84	2.10	0.84
3.00	0.72		0.08	0.29	0.76	2.20	0.76
3.25	0.78		0.06	0.25	0.69	2.30	0.69
3.50	0.84		0.00	0.00	0.00	2.40	0.00

Computations

In order to determine the correct distance from the front face of the rear cowl bulkhead to the back of the prop, the engine was mounted on the firewall with the rear cowl bulkhead in place, the forward cowl bulkhead was installed on the crankshaft, and the distance was measured as 5-5/16" as shown below. You can also see two of the four the 3/32" piano wire cowl alignment pins.

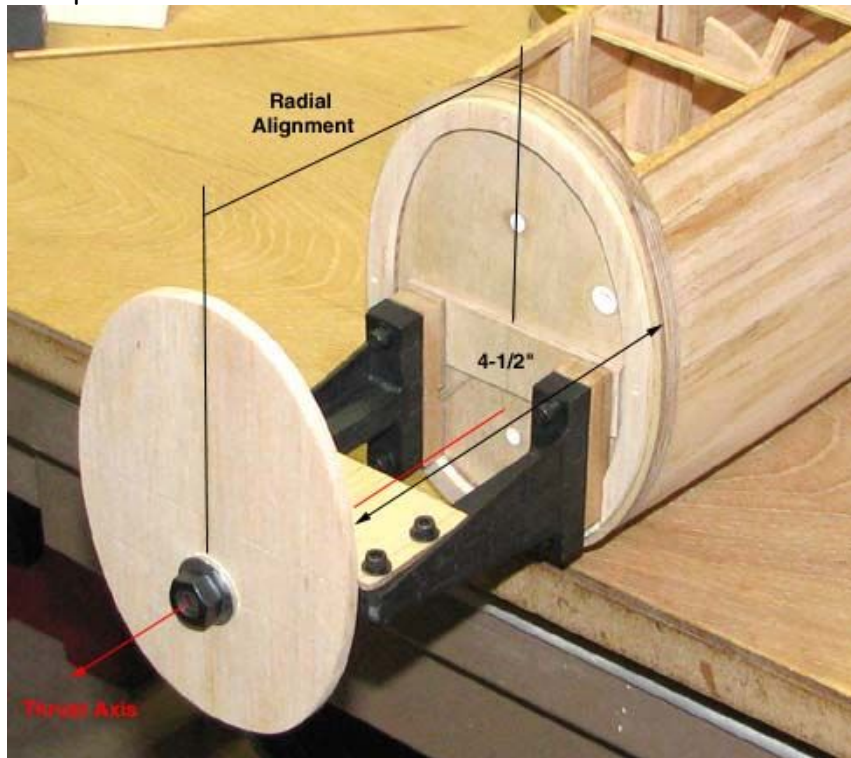


Now, accounting for the thickness of the cowl's 3/8" outer nose ring, allowing for at least an 1/8" prop clearance, and the temporary 1/8" stand off behind the motor mounts, an adjustable jig fixture was built up to achieve a 4-1/2" distance between the front face of the rear cowl bulkhead to the back face of the front bulkhead as shown below. The head of a bolt with the same diameter and threads as the McCoy 60 crankshaft was cut off and the threaded portion of the bolt was epoxied into a 1/8" plywood plate. The center line of the bolt was aligned with the bottom of the plywood to properly align the thrust axis. Four holes were drilled in the 1/8" plywood plate to match the motor mount holes and the plate was secured to the motor mounts as shown below.



Finally, the forward cowl bulkhead was bolted to the plywood fixture using washers and prop nuts on either

side of the bulkhead. The distance was then adjusted to achieve the 4-1/2" dimension and also radially aligned to rear cowl bulkhead as shown below. Before the cowl is planked, cowl retention brackets will have to be designed and built in place.



Building this jig fixture was as much work as building the cowl itself, but it was the only way I could figure out to build a cowl that would fit.....Tandy