

Bob's Card Models

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Sikorsky S-40

The Sikorsky S-40 was an American amphibious flying boat built by Sikorsky in the early 1930s for Pan American World Airways. It was the largest commercial airliner of its time. A total of three aircraft were built by the Vought-Sikorsky Aircraft Division of the United Aircraft Corporation in Stratford, Connecticut. All three were retired from service during World War II. The first passenger carrying service was on the November 19, 1931 and was piloted by Charles Lindbergh from Miami, Florida to the Panama Canal Zone. The S-40 was the first of many aircraft known as Flying Clipper and Pan Am Clipper.

The S-40 was nicknamed the "Flying Forest" for its maze of support struts.

Specifications

General characteristics

Crew: four

Capacity: 40 passengers

Length: 76 ft 8 in (23.37 m)

Wingspan: 114 ft 0 in (34.76 m)

Height: 23 ft 10 in (7.27 m)

Wing area: 1,875 ft² (174.3 m²)

Empty: 24,748 lb (11,249 kg)

Loaded: 34,000 lb (15,455 kg)

Maximum takeoff: lb (kg)

Powerplant: 4x Pratt & Whitney R-1690 radial engines, 575 hp (429 kW) each

Performance

Maximum speed: 135 mph (217 km/h)

Range: 875 miles (1,408 km)

Service ceiling: 13,000 ft (3,963 m)

Rate of climb: ft/min (m/min)

Wing loading: 18 lb/ft² (89 kg/m²)
Power/Mass: 0.07 hp/lb (0.11 kW/kg)

Building Instructions

Print all sheets on between 160 and 230g card, except Instructions and Sheets 10 and 11 which should be printed on 80 - 90g Paper.

Always carefully fit parts together before gluing, and make minor adjustments if necessary.

Bright Green areas must be cut out, BUT only after gluing any folds. The Instructions will tell you when!

Although the model is relatively small, bulkheads have also been used to keep the correct cross-sectional form of the fuselage.

Thanks, for providing the excellent 3-D views, to : "l'encyclopédie illustrée de l'Aviation" No. 127, and to <http://www.airwar.ru/other/draw/a5m2.html> for their free solid model plans.

NOTE: When gluing on wings, tailplane and part **5A**, make sure that they are exactly in line with the cockpit. Use elastic bands until the glue is dry.

Fuselage

1. Cut out **3**, bend the 2 sides (hull) to give the correct cross-section, round the form and especially the hull, glue on the long tab (which has been bent longitudinally to a V-form), and when dry, close/glue the form.
2. Insert bulkhead **E** (with centre pierced) through the front of **3** (side with black area facing to the rear), all the way through until flush with the rear, snipping off bits of **E** to accommodate if necessary, and tack/glue.
3. In part **3**, cut out the 2 slits above the foremost windows, and insert a waste piece of card as a stop when inserting bulkhead **D**.....
4. Insert/glue-tack **D** (with centre pierced) in the front of **3**. Push so far as it comes in contact with the card waste strips. When dry, remove the waste strips.
5. Cut out **2**, bend the 2 sides (hull) to give the correct cross-section, round the form and especially the hull, glue on the long tab (which has been bent longitudinally to a V-form), and when dry, glue around the tabs of **3** as well as the long tab to close form.
6. At the rear end of **2**, insert/glue-tack **C** (with centre pierced) in place so that it is flush (black portion pointing to the rear).
7. Insert bulkhead **B** (with centre pierced) through the front of **2** at about 5-10mm depth from the front of the part (do not force bulkhead, must sit loosely), tack/glue in place.
8. Glue together **2** and **3**. If the tabs on **2** are a bit too long (pressing on bulkhead **D**), shorten.
9. Cut out **4 - 7**. Round **4** to give the correct profile, add on **5** and **6** after bending their tabs 45°, and end tab of **5** to 180°.
10. Slight fold/round **7** and glue onto **4/5/6** (first one side, when glue dry, then the other side), and glue the unit onto the tabs of **3**, noting the step in the hull.
11. Cut out **8A-E**, bend tabs 45° excepting the grey-coloured tabs which are bent 90°.
12. Glue **8B** onto **8C**. Glue **8A** onto **8B** so that the rear of **6A** is flush with the rear of **8B**. Likewise the right-hand side.
13. Close/glue form.
14. Cut out windows **1**, bend in the middle, bend tabs upwards except the side tabs (coloured grey).
15. Glue the tabs of **1** onto the inside of **8C**.
16. Glue the unit **8A-E / 1** in place on the front of **2**.
17. Cut out, fold, glue **9** on the top of the fuselage, starting from just above the cockpit windows.
18. Cut out green area on top and rear of **4**.

Wings

19. Cut out both wings **10**, fold, bend tabs, glue each, then join
20. Cut out the Wing Join **11**, fold (round) the leading edge, then glue on the 3 Form Members **11A** as shown in the photo, glue the top edge of each member, close form.
21. Glue one half of the Wing Join and insert in one of the wings; when dry, glue the other half and insert in the other wing. NOTE: the lower edge of the Form Members is curved - whilst the glue dries, hold in place gently with the fingers.
22. Cut out the 2 green slits in the wing (upper and lower sides) - ready for insertion later of the horizontal stabilisers **29**.

Engines (4)

23. Cut out **12**, close form by gluing tab. Cut out a paper black strip **12B** and glue on the inside of **12**. Snip both sides along tiny lines (even better, cut out a tiny wedge in each case).
24. Cut out **13**, form to a flat pyramid, glue tab.
25. Cut out **14**, round and close/glue form.
26. Cut out **15**, make 3x thick by gluing on waste card, pierce centre to accommodate a tooth-pick, then Insert in **14** as far as it will go, with glue on the rim.
27. Glue **13** in place, on **14**.
28. Part **12**: bend down the 'snippets' of one side, glue on the inside. When dry, insert from the rear of **13/14**, bend down the front 'snippets', glue.
29. Pierce the 2 green dots 'e' on each engine, enlarge with a tooth-pick to about 1-2mm diameter, cut out the 2 green slits.

Struts

30. Cut out the 2 main horizontal struts **16**, fold length-wise along the 3 dotted lines to give 4x thickness, glue - but only the rear of the grey strips, so that a space remains for later insertion of the tabs of the slanting struts. Press on a flat surface with a ruler, to ensure good adhesion, and a straight strut.
31. Insert the 2 horizontal struts in place, through the 2 green slits (cut out) above the 4th and 7th windows of the fuselage and glue in place.
32. Cut out the 4 slanting struts **17** and fold/glue as in 29. above; this time, all the inside surfaces can be glued.
33. Put a dab of glue on the tabs at one end of a slanting strut, and insert IN the end of a main horizontal strut; whilst the glue dries, bend up to an angle of ABOUT 45° and glue on position marked "a" on wing underside. Repeat with the 3 remaining slanting struts.
34. Cut, fold, bend all tabs outwards, and glue the 4 Main Engine Spars **18** (outer, front and rear), in 2 of them insert the engines (glue in the marked place on the spars with the 2 green dots 'e' UPPERMOST), and glue in blue rectangle position marked "c".
35. Likewise the 4 Main Engine Spars **19** (inner), and glue in blue rectangle position marked "d".
36. Cut out, roll the V- Struts for the engines **20**, roll/glue around a long pin, extract pin. Bend in the middle to a V, and glue the 2 arms in place in the engine housing at positions "e" (pierce beforehand), and the V-bend at position "c".
37. The rear struts **21** are only half-length as otherwise they would be too long to roll around a pin. Cut them out, roll around a pin, glue, extract pin, flatten each end about 5mm, then glue in position on the engine housings at positions marked "f", and to the top of the rear vertical struts **18** and **19**.
38. Cut out the 4 Tie Spars **23**, roll around a tooth-pick and glue. Snip each (after flattening the tube a bit) end about 2mm to give 2 tabs at each end - bend these back 90°, and glue in place joining the middle of **17** to the wing. Make sure the spars are parallel to the struts **18**.
39. Cut out the 4 Tie Spars **22**, roll around a tooth-pick and glue. Extract tooth-pick, flatten each end about 5mm. Glue 2 of the spars in position joining the extremities of the main horizontal struts **16**, and the other 2 to join the base of the front and rear Tie Spars **23**.
40. Insert the Horizontal Engine Spars **15** - 1 each, for each engine: in the hole formed at the rear of the engine, and the tabs glued around rear vertical spar **19**.

Propellers

39. Cut out, fold, glue, cut out the propellers **24** and their respective Nose Cones **25**. Glue the props each on a tooth-pick, glue on the Nose Cones. Insert in the engine after cutting the tooth-pick to an adequate length. (NOTE: Best to insert the propeller units during the last stage of construction, otherwise they will get in the way, and perhaps become damages).

Tailplane

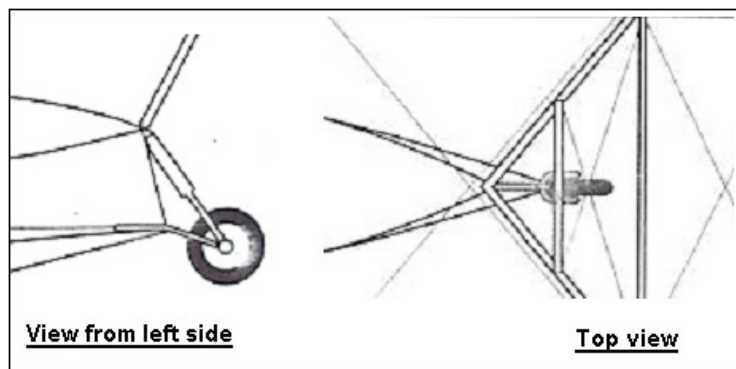
41. Cut out tailplane **26**, fold main tab and the 2 halves, and cut out the green areas. Do not glue yet!
42. Cut out the 4 fins **27**. Fold the 2 halves and the main tab, and fold UP the small tabs. Glue the main tab and close the form. Do not yet glue the tops of each fin together.
43. Insert the 4 fins in their positions in **26**, and glue their small tabs to the inside of the tailplane.
44. Glue/close the 2 wing halves.
45. Through the top of one set of fins, insert the stabiliser **28**, but it is not necessary to glue it in place. Close/glue the tops of each fin.
46. Repeat for the other set of fins.
47. Cut out the 2 horizontal stabilisers **29**, fold, insert packing, close/glue.
48. Glue onto horizontal stabiliser of tailplane in the 2 green slits previously cut out. Cut out support **30**, roll/glue around long toothpick or rod of 2-3mm diameter, extract toothpick, flatten, cut 2 x 3mm long slits in each end, bend to a V-form, and glue in place (the V in the green cut-out slit at the rear of **4**, and

the 2 other ends on the underside of each part **29**, so that the stabilisers **29** are parallel to the middle-line of the fuselage). Glue the tabs of horizontal stabiliser **30A** to join the 2 V-ends of part **30**, and **30B** half-way down, inside the V-strut. NOTE: There are actually 2 parts **30A** - place one exactly above the other, with about 3-5mm space between the 2.

49. Glue the front ends of the horizontal stabilisers **29** to the cut-out positions of the main wing.

Undercarriage

50. **Rear Wheels:** cut out and roll/glue tyre **31**. Pierce centre. Glue a wheel cap **32** on each side. Pierce centre.



Rear Wheel Assembly

51. Cut out and roll/glue vertical strut **33** so that about 5mm of the tooth-pick point protrudes. Cut the other end so that 1mm protrudes.
52. Cut out rear wheel cover **34**, pierce centre, fold, insert in pointed end of **33** and insert/glue pointed end in the rim of the wheel in which a small hole has been drilled/cut.
53. Glue the ends of **34** to the centre of the wheel caps. Glue the other end of the toothpick on the rear of the fuselage (part **7**).
54. Add left and right of the fuselage, parts **35**. Glue in position on the fuselage and on the wheel covers **34**.
55. **Main undercarriage:** form a V with 2 toothpicks, and glue the join (see Sheet 11 diagram). When glue is hard, add 2 sleeves **36** to the Wheel Main Struts **37**. Repeat for the other side. Insert each in the positions marked (green, cut out) and glue in place. The necessary angles are shown on Sheet 11.
56. Cut out the 2 (left and right) vertical supports **38** to the undercarriage, glue around a toothpick, and when dry, bend ca. 80-90° by cracking the tooth pick at the white line. Glue in place - top end inside the slit marked "38" on top of the fuselage, bottom ends on the inside of the Wheel covers, joining part **37**.
57. Add the wheels **43** and glue these in place with a dab of glue. Add the wheel caps **43A**.

Floats

58. Cut out the 2 floats **39**. Bend to form. Slightly bend all tabs, then glue tabs in the following order - a, b, c, d, e. Insert the 3x thickness bulkhead to preserve profile. Cut out all green slits (for the spars). Option: omit the Bulkhead if no difficulty is encountered in forming the correct cross-section of the floats.
59. Add the struts: Cut out 2 of the struts **40** and roll/glue each around a tooth-pick. Remove toothpick, flatten. Bend in the middle to a V-form, insert/glue in position (inverted V) on top of the float in the positions marked on the top of the float at the front, and at the rear. Repeat for the other float. Add a dab of glue on the top of the inverted V, and hold in position until dry. Add the inclined struts **41**, insert the tabbed end into the float, and when dry, put a dab of glue on the other end and glue to the underside end of the main struts **16**.

Aerial

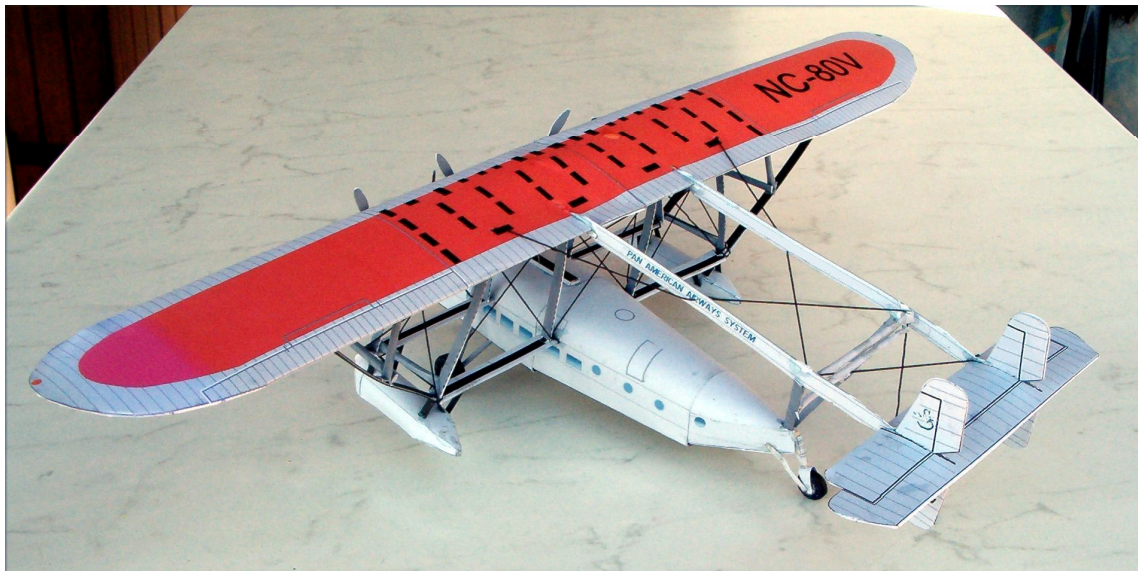
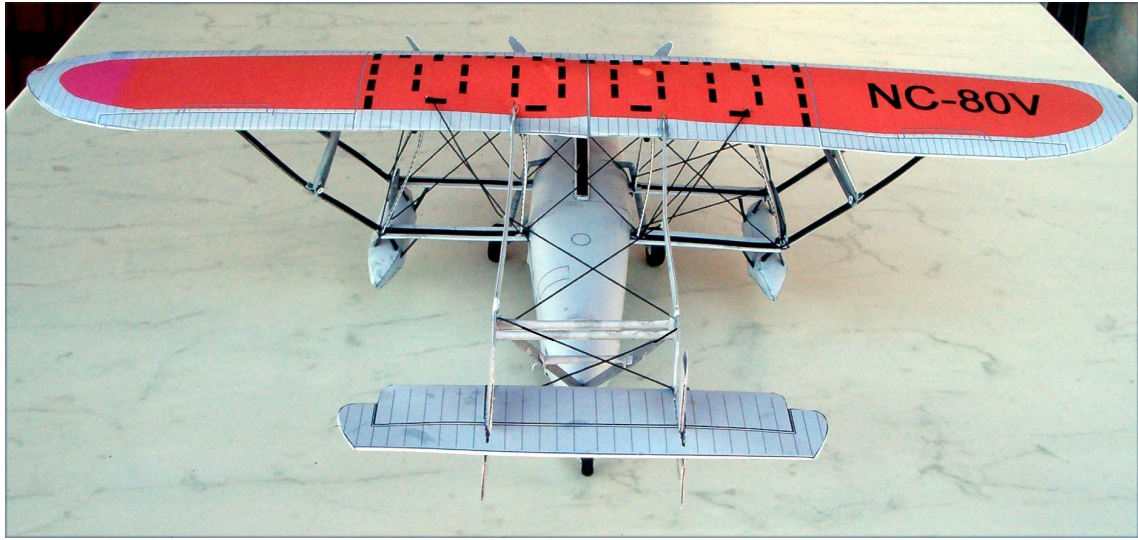
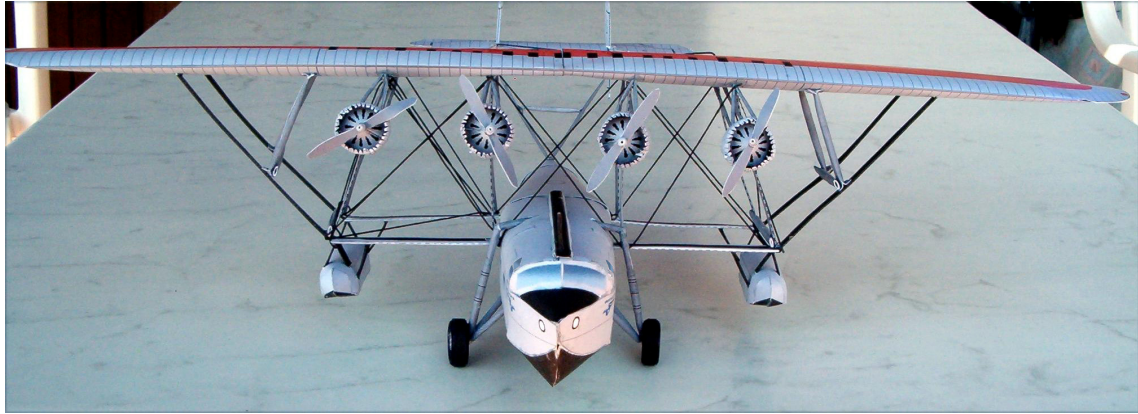
60. Add aerial **42** just above cockpit.

Rigging

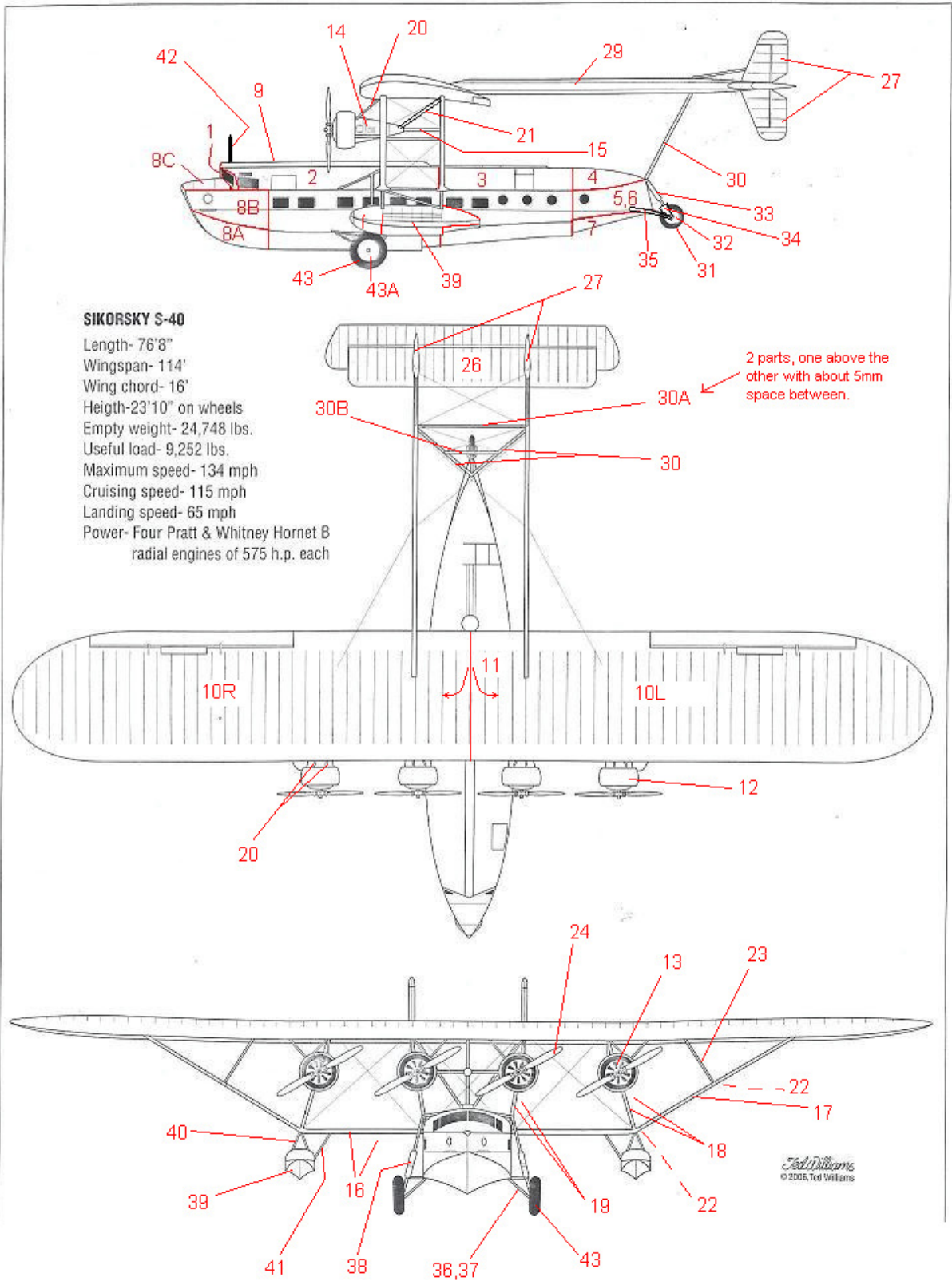
Some of the rigging (cables) has been attached and purists may say that some or other cable is missing. I have absolutely no objection to additional rigging, but I added only the main ones.

I use cotton-coated rubber to give an elasticity. Use under minimal tension, just enough to prevent sag.

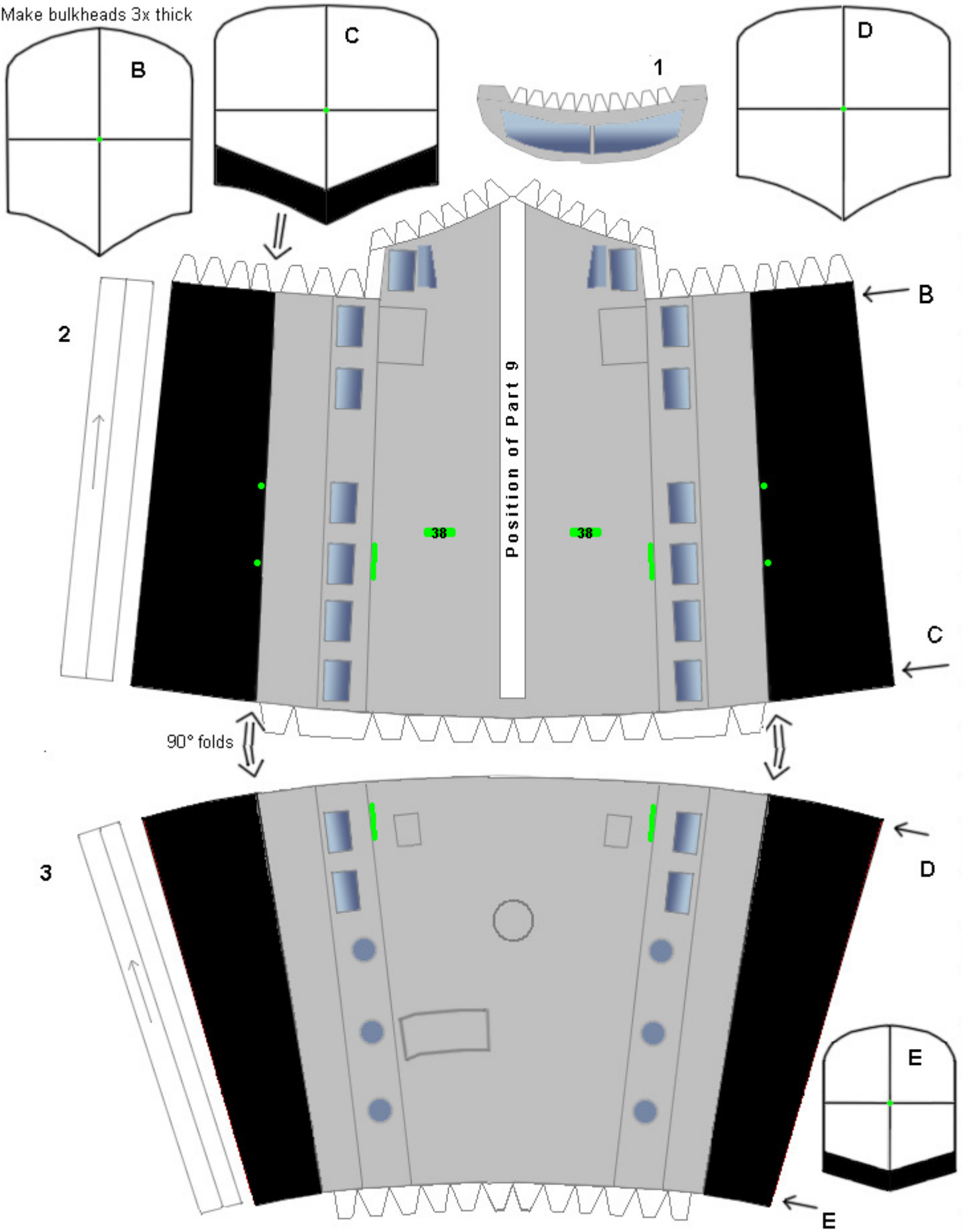
---oooOooo---







Make bulkheads 3x thick

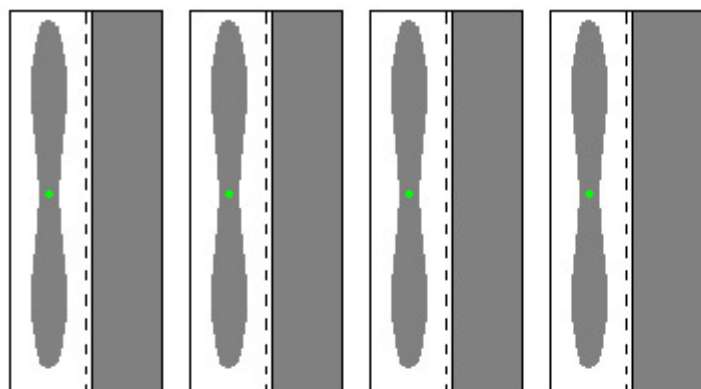
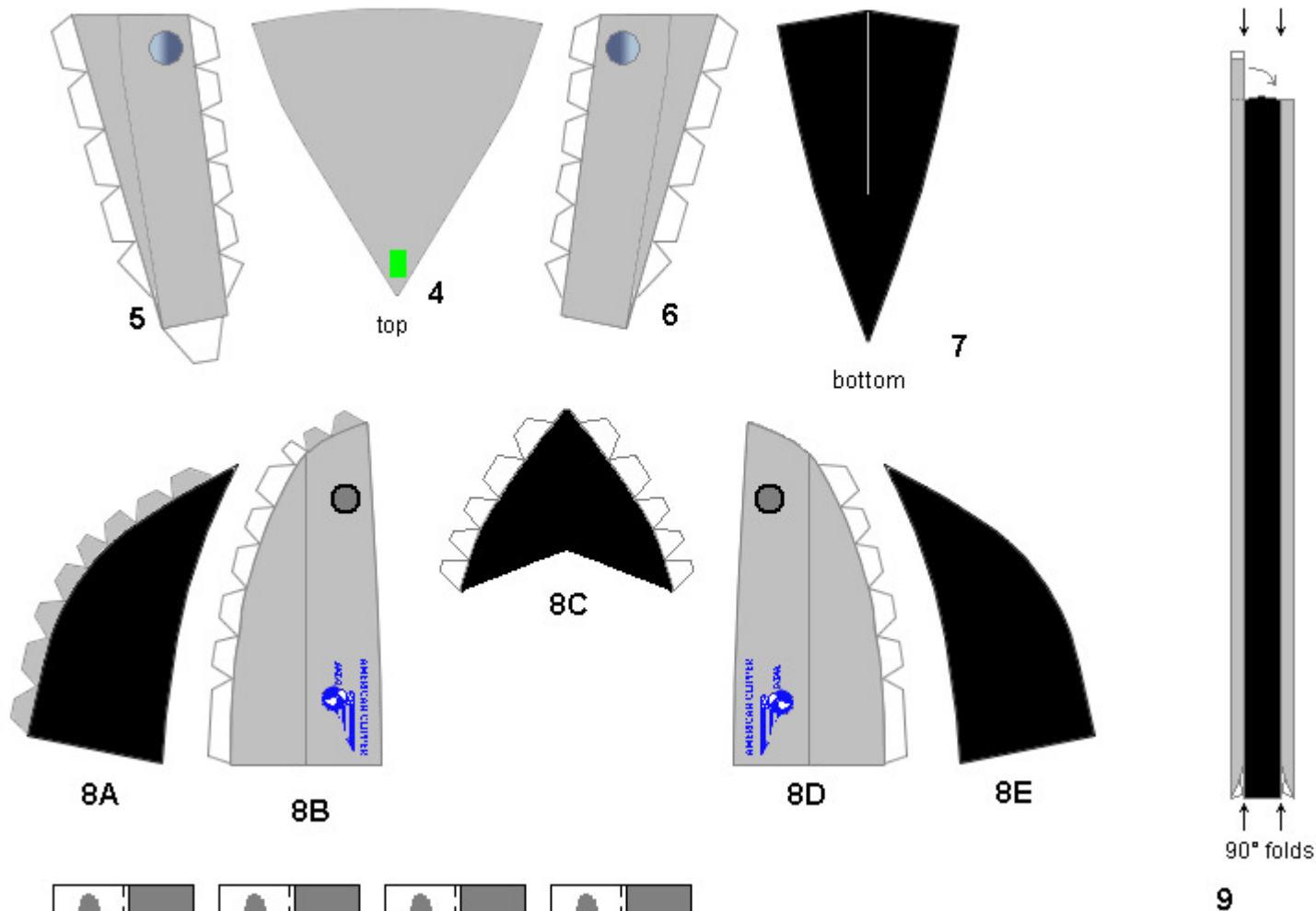


Sheet 1

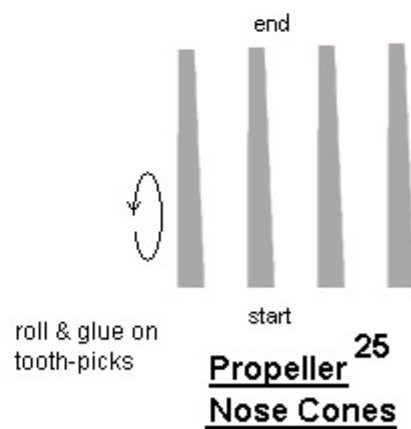
S40

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Propellers²⁴



Bottom

Top

NC-80V

c

c

d

d

Right Wing 10R

Sheet 3

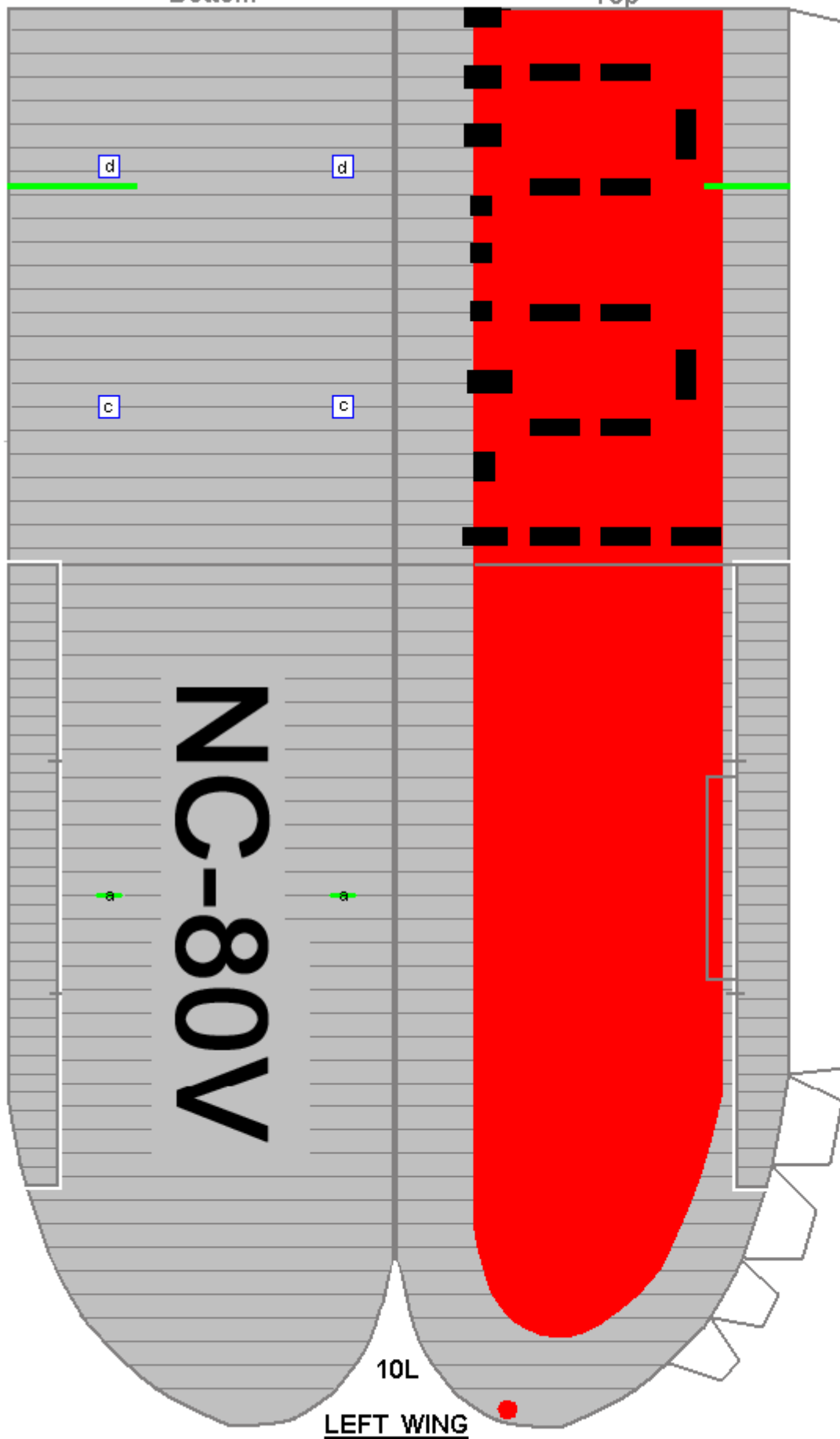
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Bottom

Top

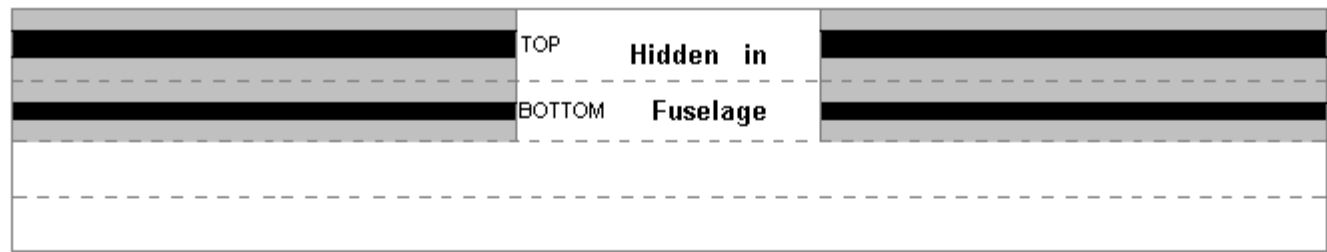


Sheet 4

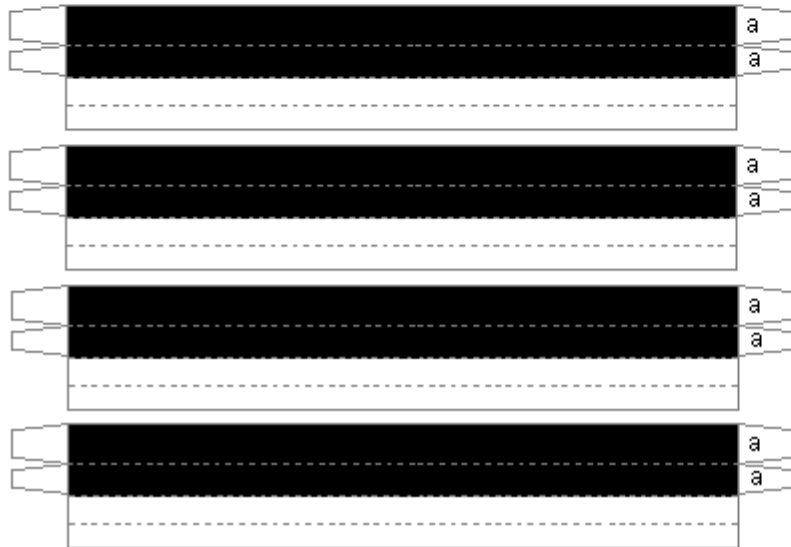
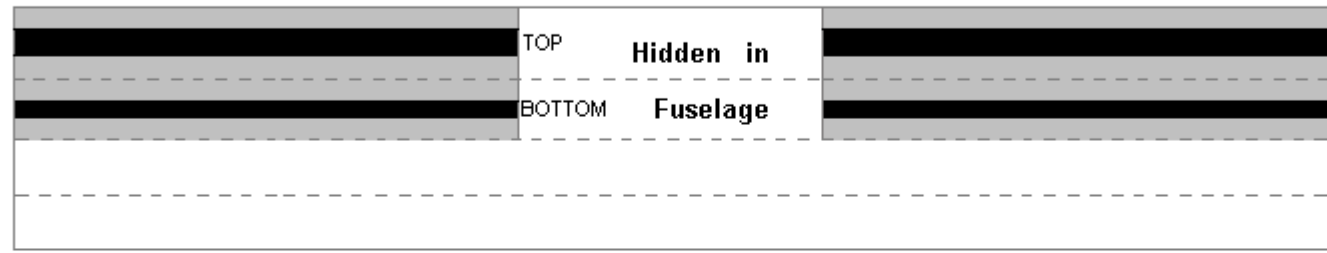
S40

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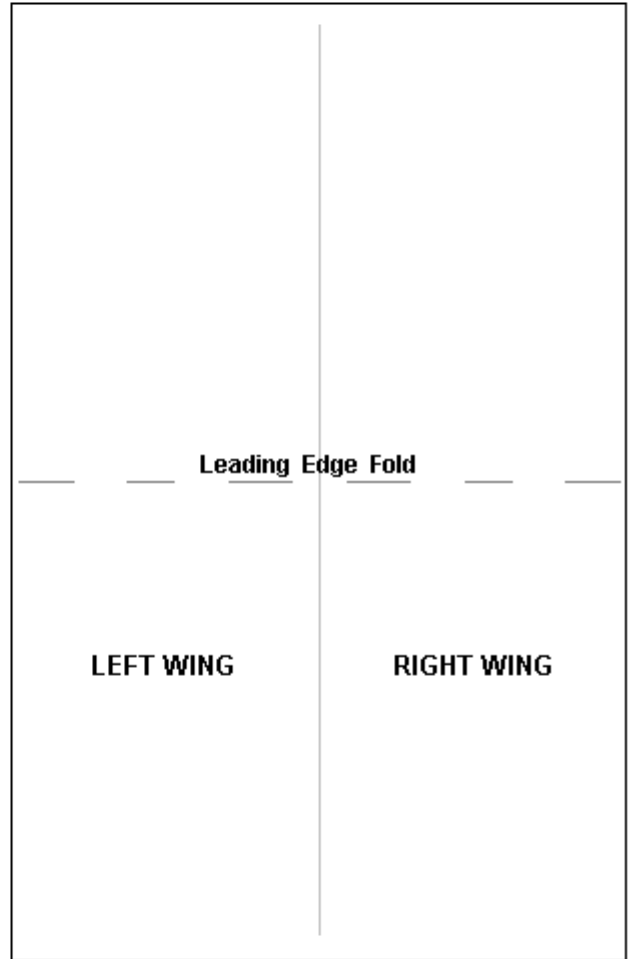


16

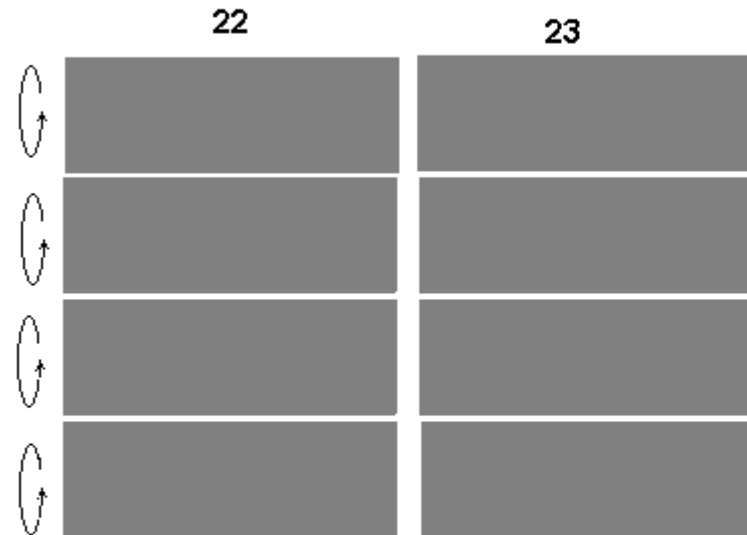


Slanting Struts 17

Fold along the dotted lines, so that black portions are on the sides.

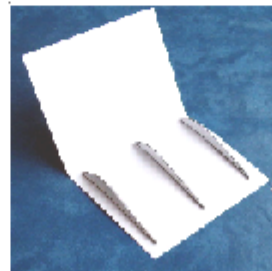


Internal Wing Join¹¹



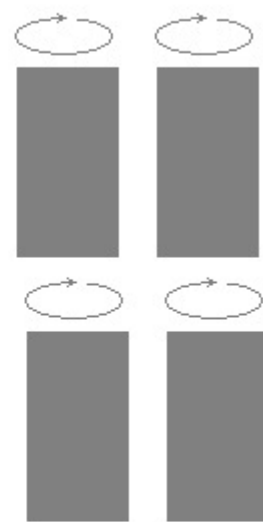
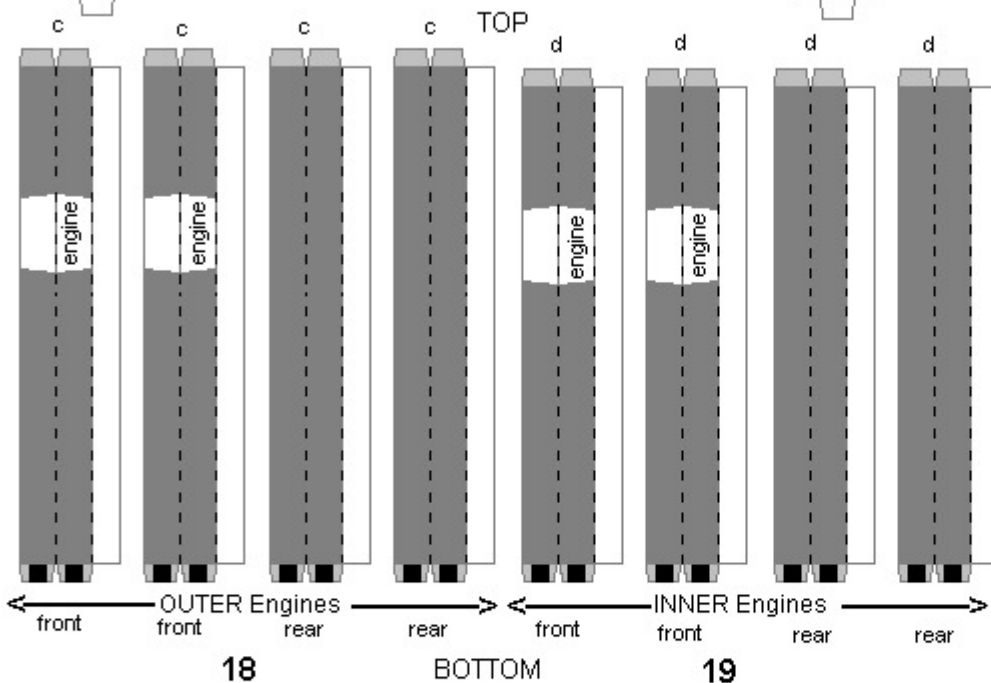
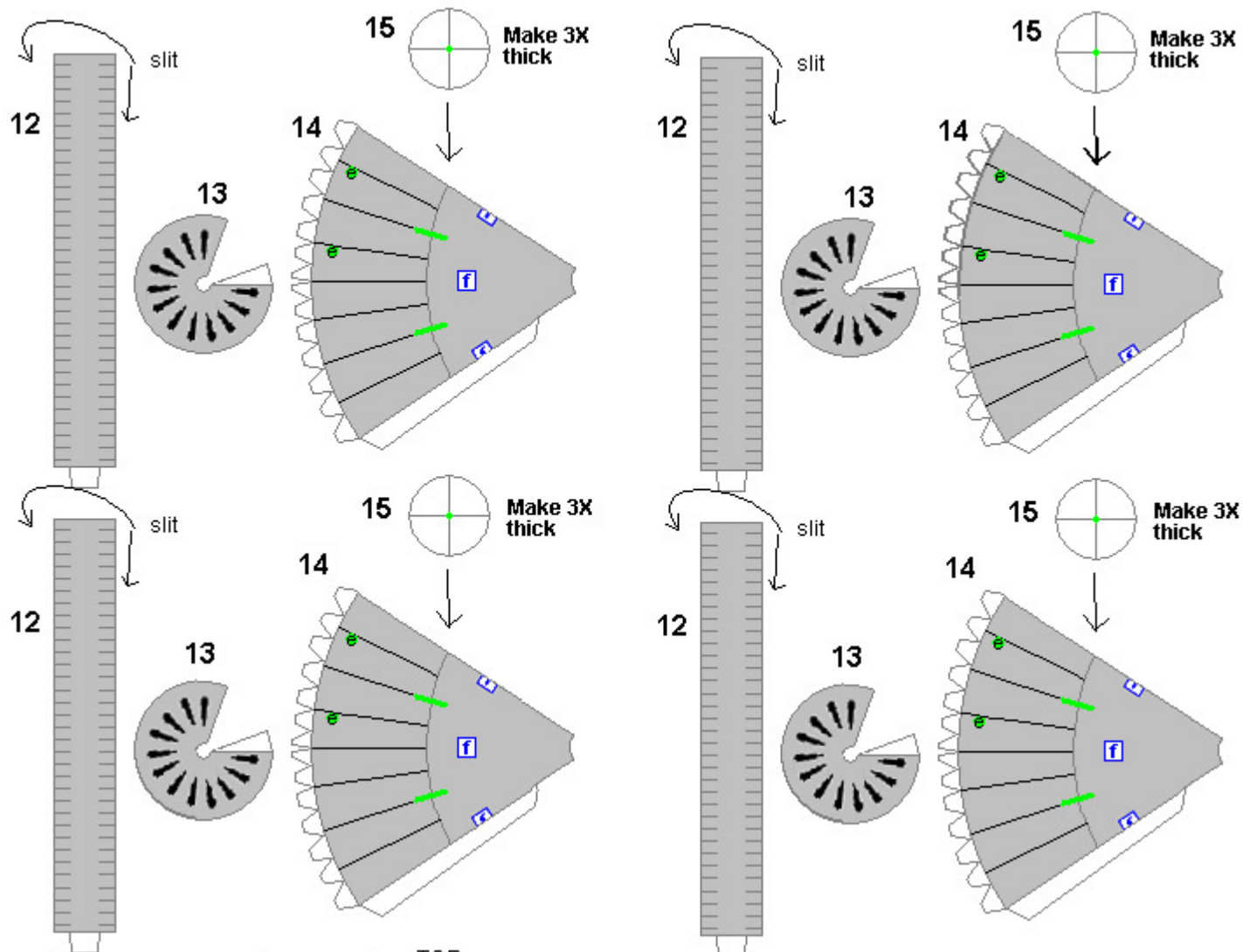
Tie Spars

Roll/glue around tooth-pick.
Extract tooth-pick.



Form Members^{11A}

Make 4X thickness



Horiz. Engine Spars 15

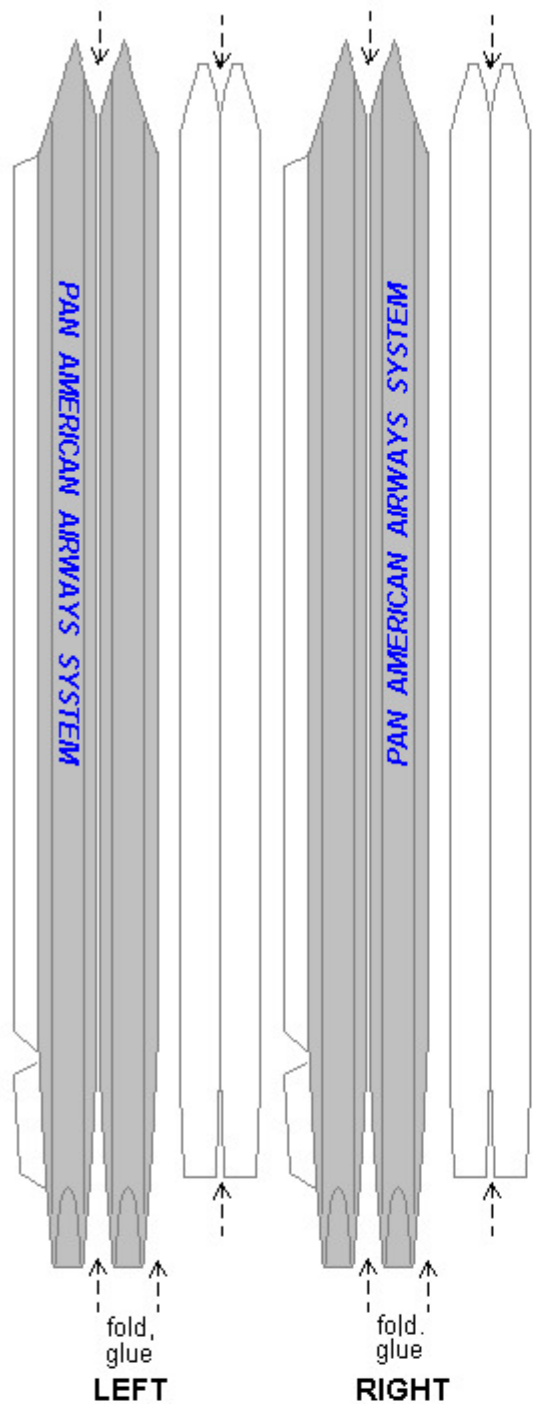
Roll/glue around tooth-picks, remove tooth-pick, cut 2 x 3mm slits at one end, splay to give tabs.

Main Engine Spars

Fold/glue so that both sides are grey

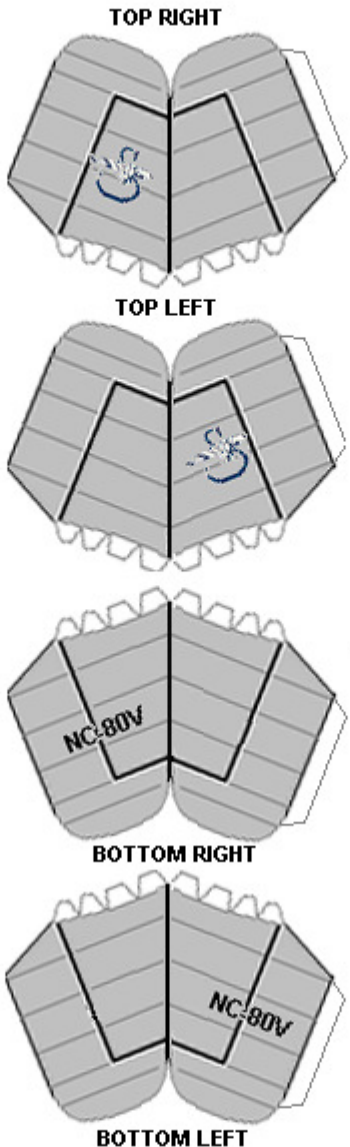
Sheet 6

S40

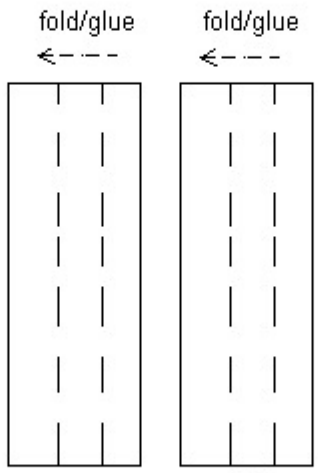


Horizontal Stabilisers ²⁹

Cut out, fold, insert white packing (to give 4x thickness), glue.

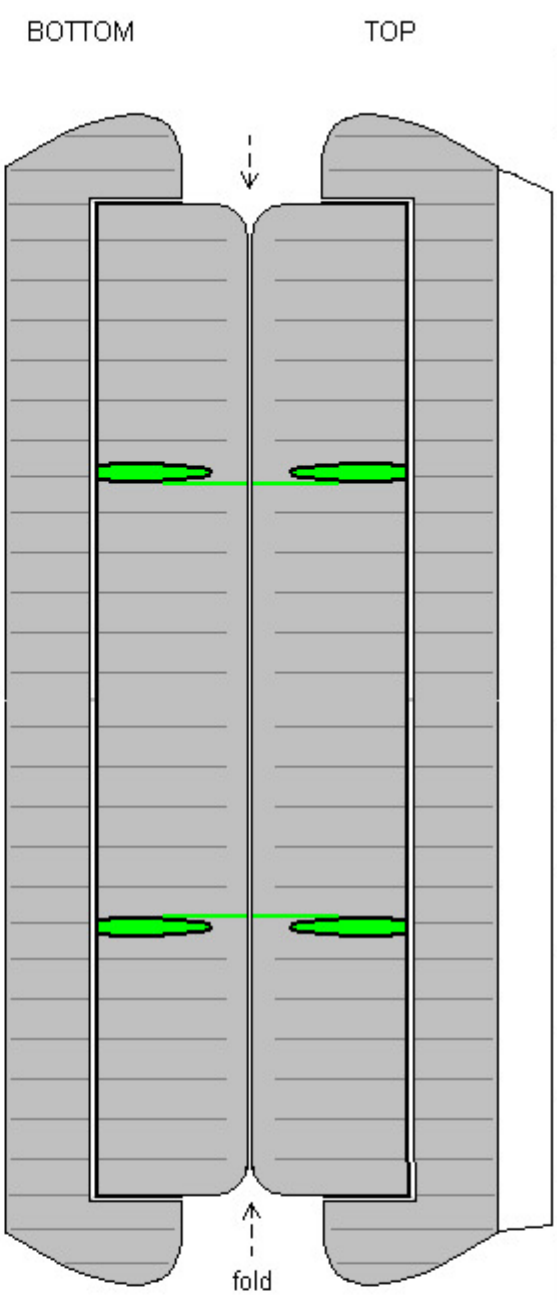


Fins ²⁷

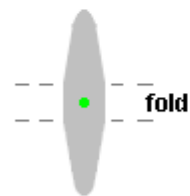


Stabilisers ²⁸

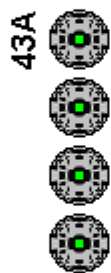
Fold each, and glue



Tailplane ²⁶



Rear 34
Wheel Cover



Rear Wheel Caps 32



Rear Wheel 31



Front Wheel 43

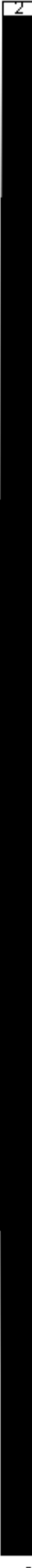
start



1



2



3



start



1



2



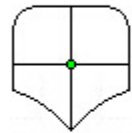
3



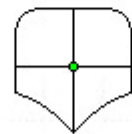
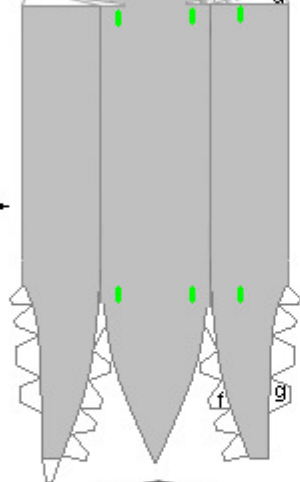
Front Wheel 43



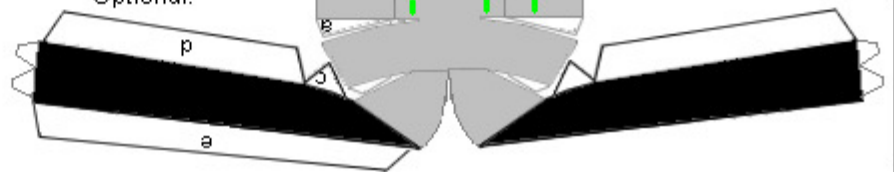
Float, Left ³⁹



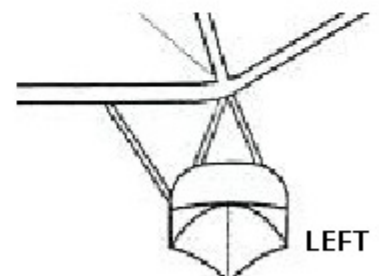
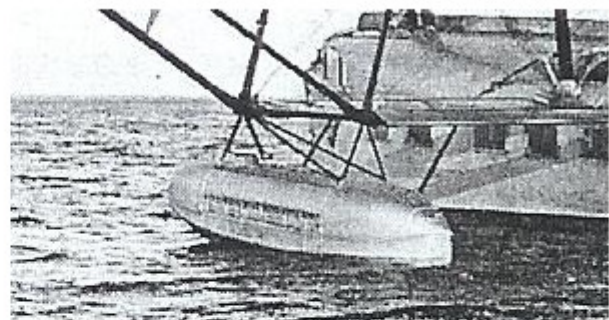
Make 3x thick
Bulkhead
Optional.



Make 3x thick
Bulkhead
Optional.

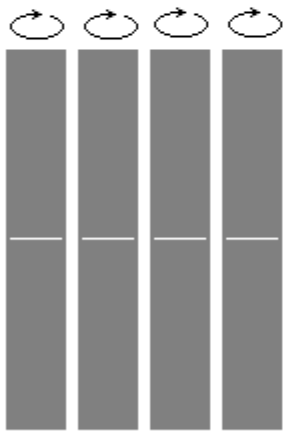


Float, Right ³⁹

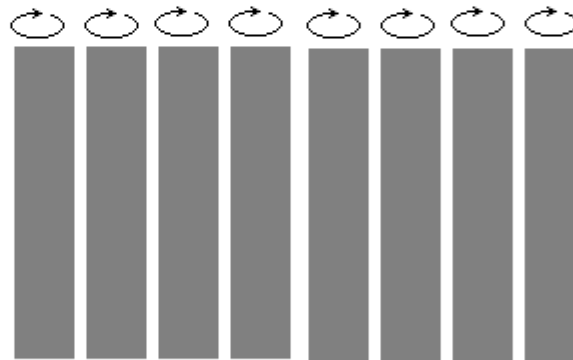




Insets to Part 12 ^{12B}

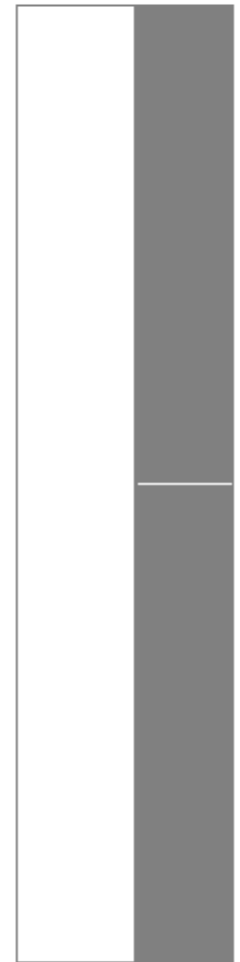


(front) ²⁰



V-Struts Engine to Wing (rear) ²¹

Roll/glue around a long pin, extract pin. For parts ²⁰, bend in the middle to form a V.



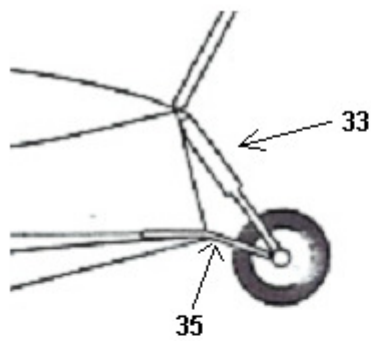
Support ³⁰



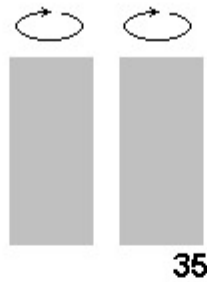
Horizontal Struts

Roll/glue on tooth-pick, extract tooth-pick, cut 2 2mm slits on each end to give the tabs.

Cut out, roll around tooth-pick, glue, extract toothpick, flatten, cut 2 x 3mm slits in each end, flatten, bend to a V-form.



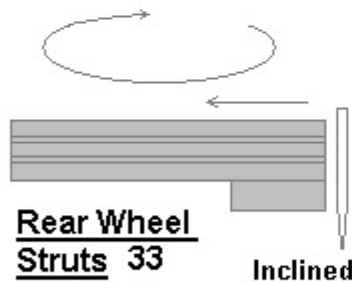
View of assembly - rear of fuselage



Horizontal struts, left and right

Roll/glue around pin, remove pin, flatten, bend slightly to shape

REAR WHEELS

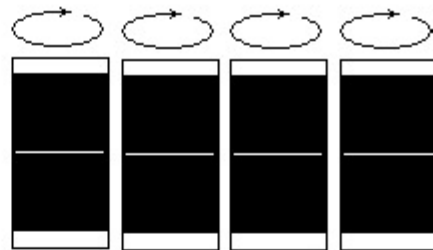


Rear Wheel Struts 33

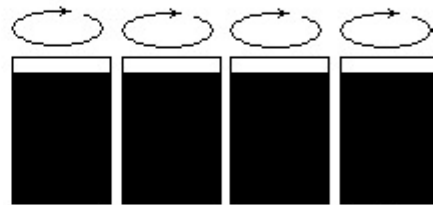
Roll/glue around toothpick

Inclined

Roll on toothpick, glue, remove toothpick.



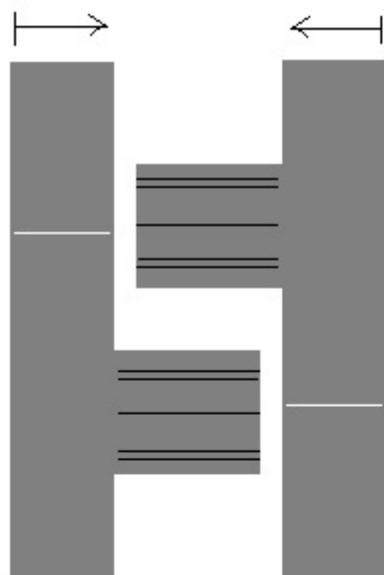
V-Struts 40



Inclined struts 41

Roll/glue around tooth-pick, extract tooth-pick, flatten.

Float Struts



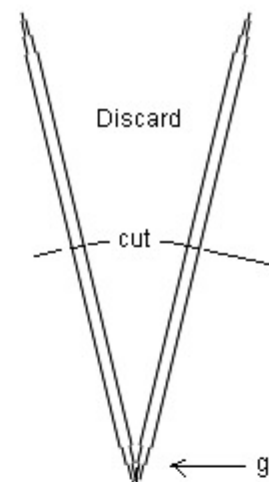
Vertical supports 38

Roll/around tooth-pick, do not extract tooth-pick! Break tooth-pick at white ring, bend 45°, glue bend.

FRONT WHEELS

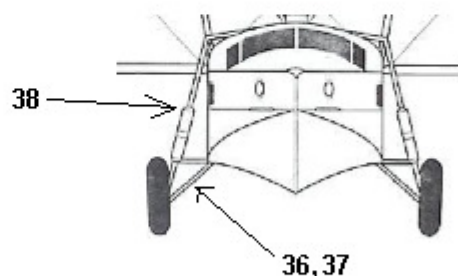


Sleeves 36



Main Wheel Struts 37

Make 2



Aerial 42

Roll around pin