

Monocopter 18

P J Lander / Aug 2004

As the RSO signed off my prototype monocopter for its maiden flight, he said “I should warn you, I’ve seen as least 20 monocopter ignitions, but only three flights”

“What happened to the other 17?” I asked.

“It wasn’t pretty.”

Talk about confidence inspiring!

As you will see at the end, all was successful, and even the RSO was suitably impressed!

Parts List

1 no 18mm motor tube
1 no 18mm motor block
1 no 300mm x 50mm x 3mm balsa sheet
1 no 300mm x 50mm x 2mm balsa sheet
1 no 300mm x 10mm x 3mm balsa strip
1 no 300mm x 50mm x 5mm artists foam board
2 no 150mm x 4mm brass tube
1 no 30mm Estes launch lug
1 no 500mm Kevlar cord
White glue – assembly of the wing and coating exposed foam
Epoxy – attachment of the motor tube and stabilisers

Sources

Artists foam board - <http://www.graphicsdirect.co.uk>

Brass tube - <http://www.greenweld.co.uk>

Construction

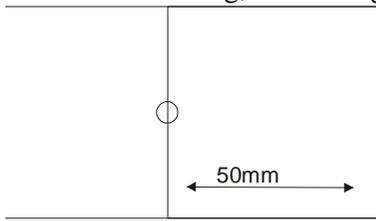
Sandwich the foam board between the balsa sheets (3mm on bottom)



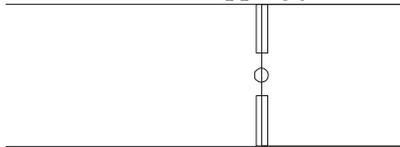
Glue the 3mm balsa strip to the leading edge of the wing



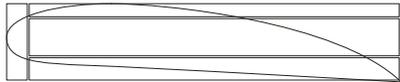
Draw a line 50 mm from the motor end of the wing and drill a hole in the middle of it for the launch lug, but don't glue the lug in yet.



Drill holes for the two stabilisers into the leading and trailing edge of the wing, along the 50mm line, stopping just short of the centre hole.



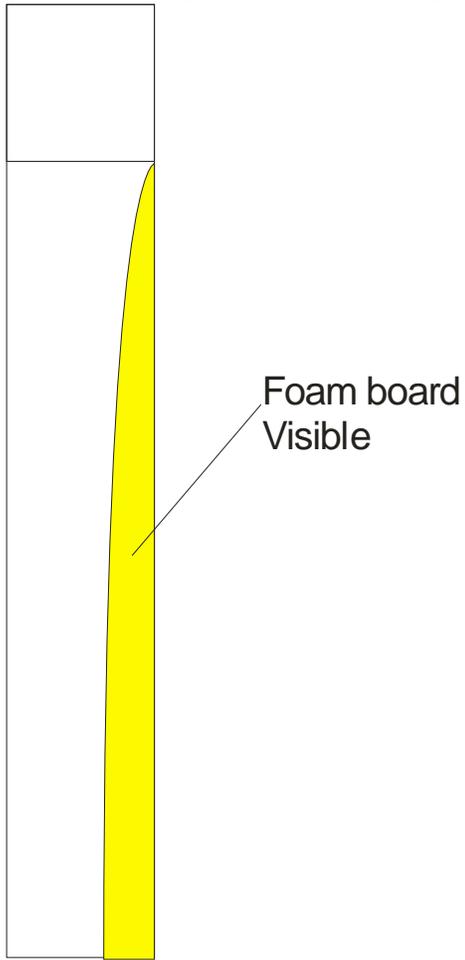
On the wingtip, trace the airfoil section below.



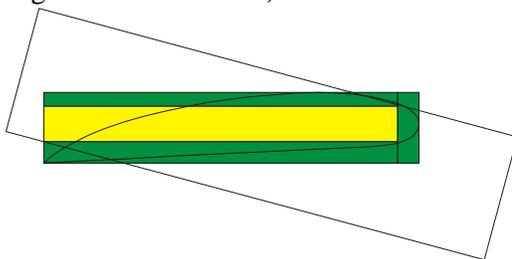
Shape the wing to the airfoil profile. (A detail sander will come in handy here!)



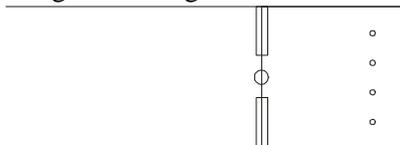
(Blend the wing shape out to the edge of the 50mm line)



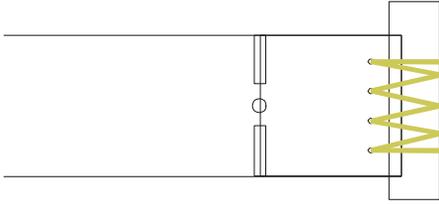
Wrap sandpaper around an old motor casing and sand an angled groove (about 15 degrees off horizontal) into the motor end of the wing about 5mm deep in the middle.



Drill four equally spaced holes in the motor end of the wing, large enough that you can get two lengths of Kevlar and some epoxy through.



Lace the Kevlar through the holes and around the motor mount, starting at one end and returning back to the start once you reach the other end, tie off and thread the loose ends of Kevlar along the motor tube.



Use plenty of epoxy to cover the Kevlar and motor mount, ensuring that you get some epoxy through the lacing holes – this part of the monocoiler takes the most stress!

Glue in the launch lug, allowing it to stick out equally of the top and bottom of the wing.

Coat all exposed sections of foam board with a thin layer of white glue.

Install a C6-0 motor and dry fit the stabiliser rods into the wing, using a horizontal rod as a pivot, check the monocoiler for balance (the prototype needed about 1g epoxied into the end of the trailing edge stabiliser)

Rough up the ends on the stabilisers that go into the wing (inside and out) to make sure the epoxy has something to grip.

Epoxy the stabilisers into the wing, making sure the epoxy gets inside the tube as well as outside – this part of the monocoiler also has a high stress level!

Glue the motor block into the motor tube.

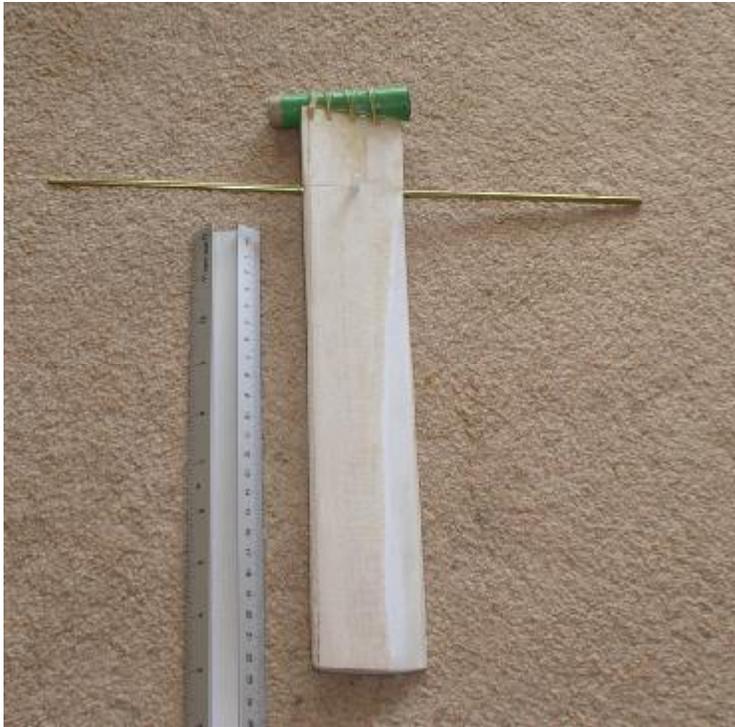
Flying

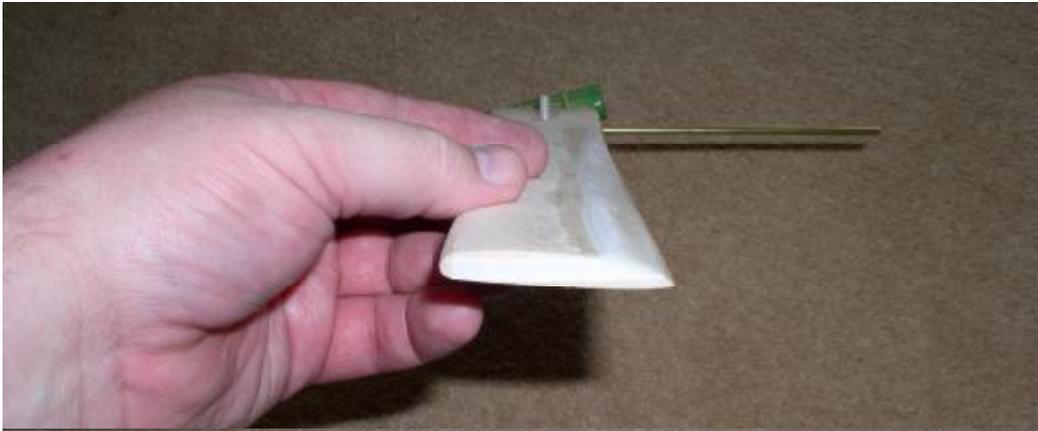
You can use a standard launch pad, but swap the long launch rod for a short (50 mm) one. Or you can make a custom monocoiler pad:

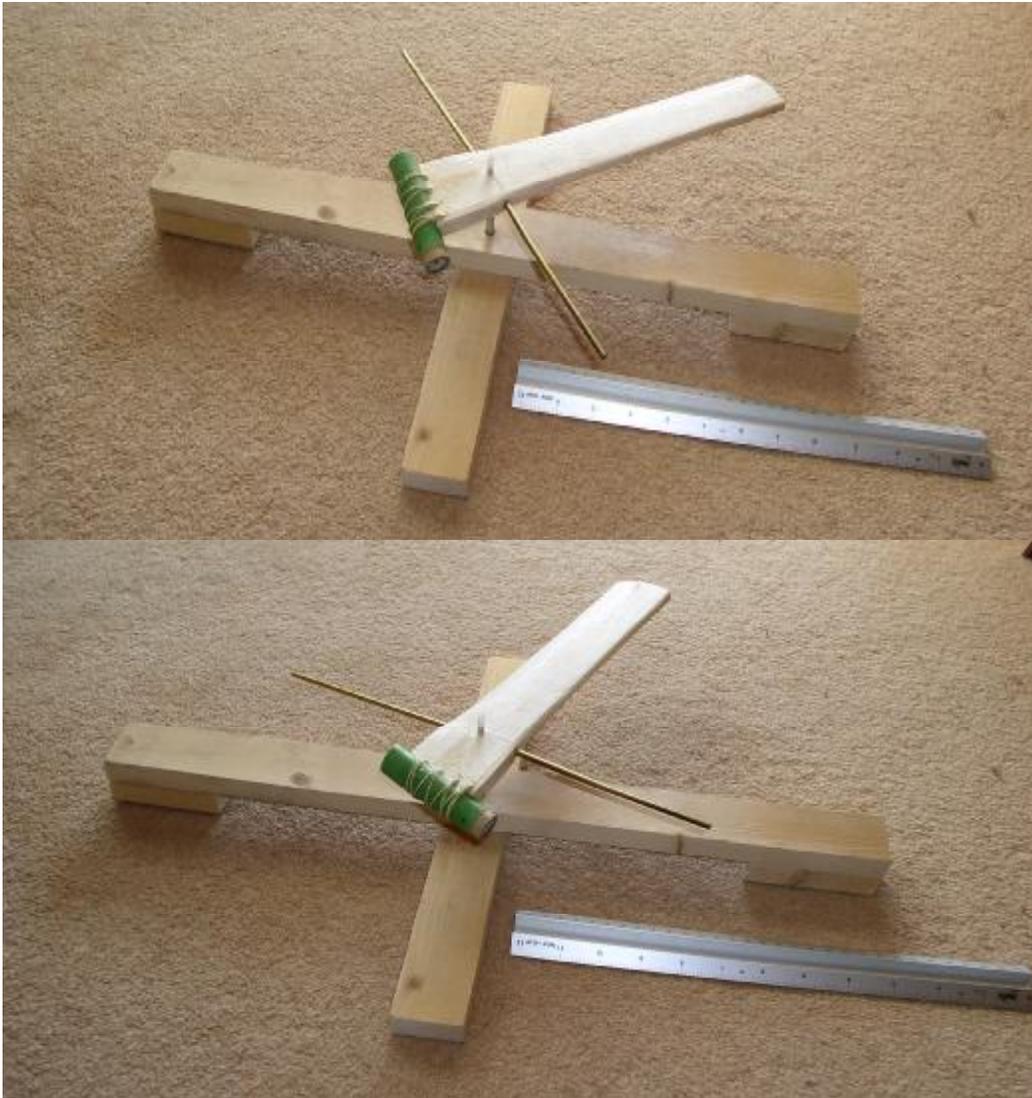


To avoid snags, when you prep your monocopter for launch, make sure the igniter leads fall away after ignition.

The Finished Article







Disclaimer

As with all these things, build and fly your monocopter at your own risk, mine has flown several times with a 100% safety record, but each flight is treated with as much caution as the first.

First Flight



Lift-off! (With RSO ready to RLH)

(Photo copyright Ian Fowler)



Motor ejection.

(Photo copyright Ian Fowler)