

- 3mm hole
- 4mm hole
- 3mm countersunk hole

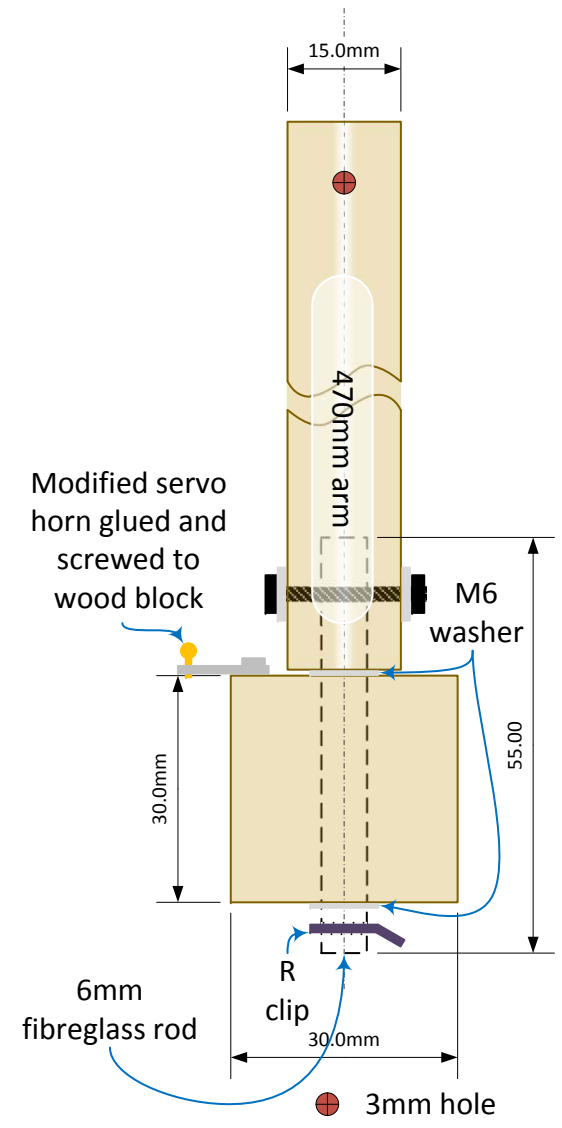
Title:	<i>Dragonfly Mk1</i>
Description:	<i>Homemade tricopter</i>
Page:	<i>Printout 1</i>
Author:	<i>Colin S. Barnes</i>
Date created:	<i>1<sup>st</sup> December 2017</i>
Last modified:	<i>15 January 2018</i>
Scale:	<i>1:1 @ A4</i>

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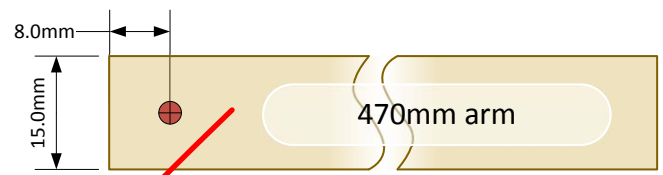
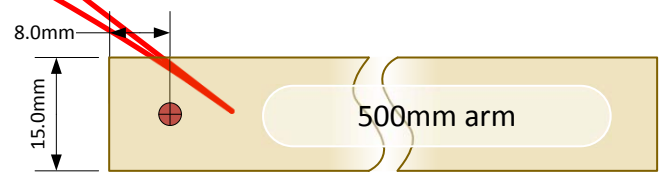
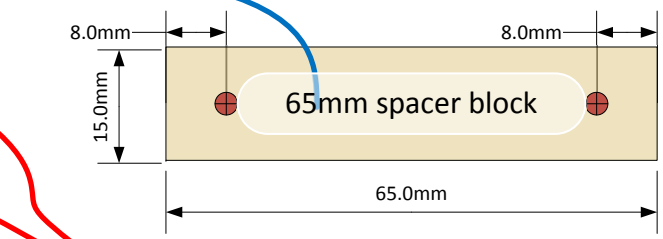
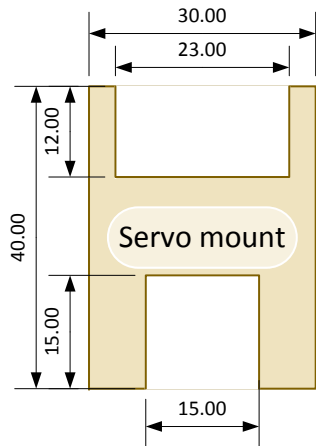
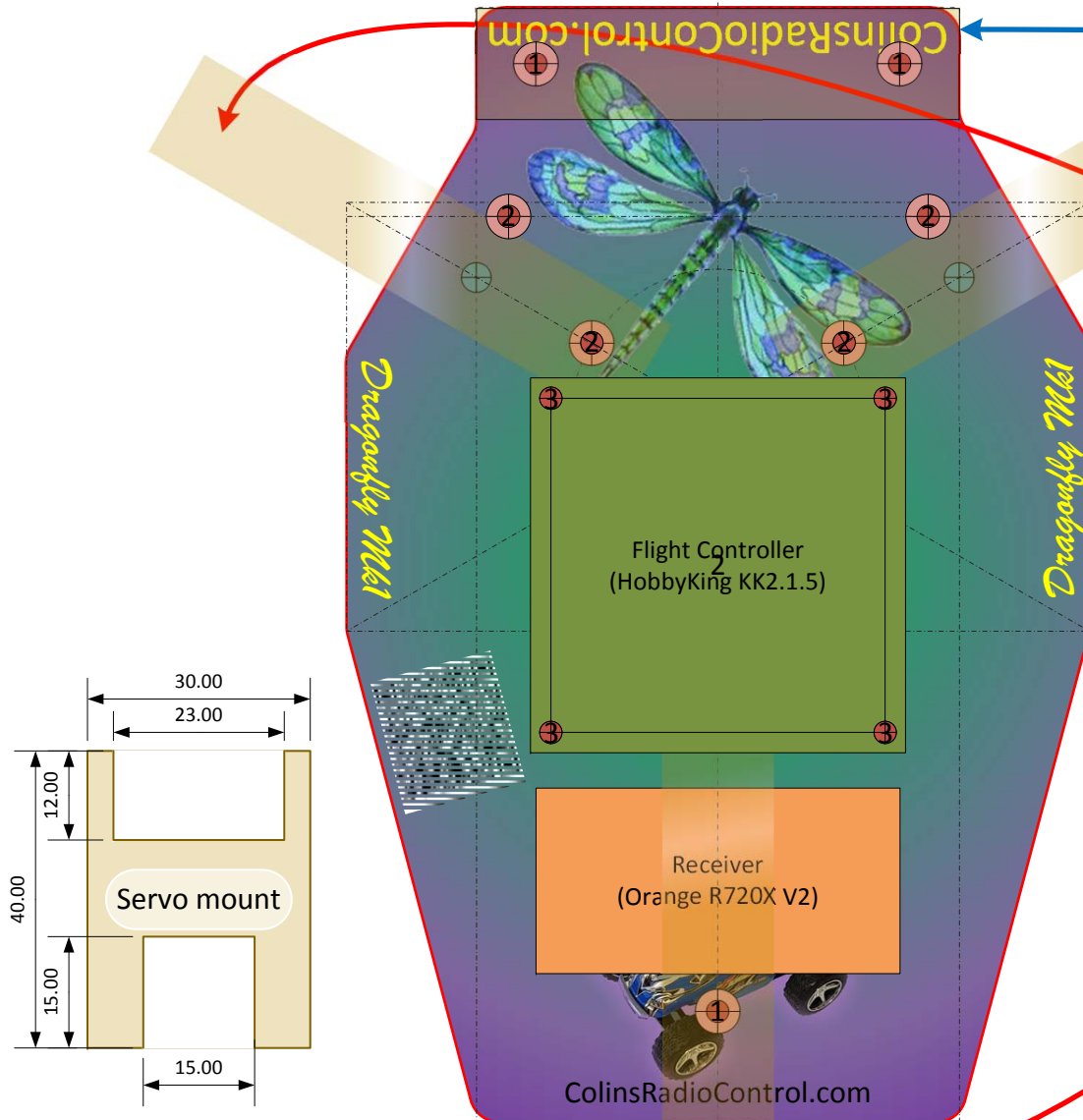





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Dragonfly Mk1



Title:	<i>Dragonfly Mk1</i>
Description:	<i>Homemade tricopter</i>
Page:	<i>Printout 2</i>
Author:	<i>Colin S. Barnes</i>
Date created:	<i>1<sup>st</sup> December 2017</i>
Last modified:	<i>15 January 2018</i>
Scale:	<i>1:1 @ A4</i>
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-  3mm hole
-  4mm hole
-  3mm countersunk hole



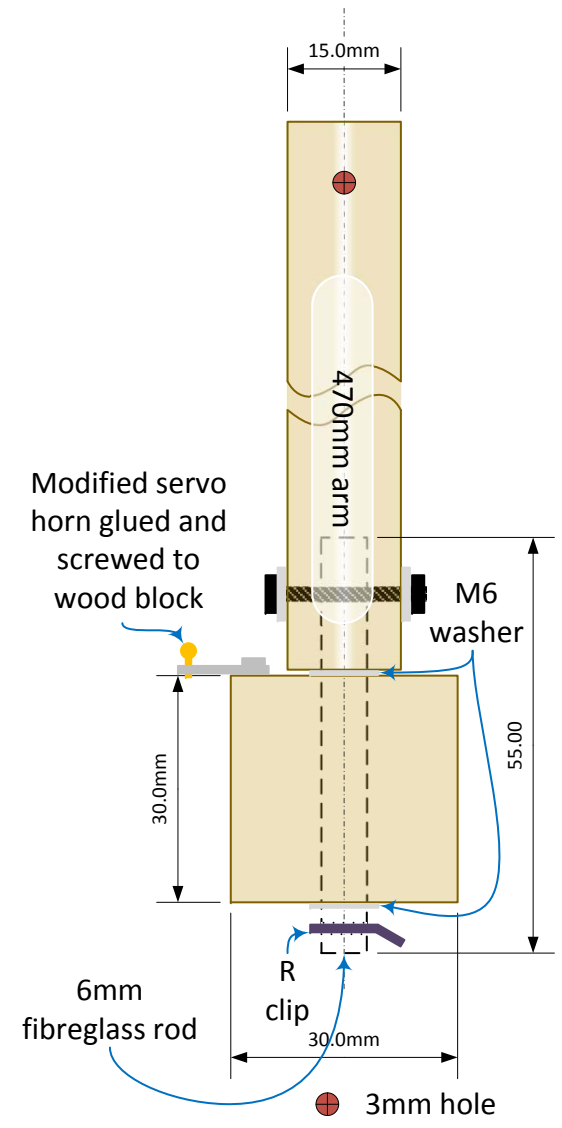
Title:	<i>Dragonfly Mk1</i>
Description:	<i>Homemade tricopter</i>
Page:	<i>Hub, Arms &amp; Spacers</i>
Author:	<i>Colin S. Barnes</i>
Date created:	<i>1<sup>st</sup> December 2017</i>
Last modified:	<i>15 January 2018</i>
Scale:	<i>1:1 @ A4</i>

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Dragonfly Mk1



Title:	<i>Dragonfly Mk1</i>
Description:	<i>Homemade tricopter</i>
Page:	<i>Bottom decal &amp; Battery holder</i>
Author:	<i>Colin S. Barnes</i>
Date created:	<i>1<sup>st</sup> December 2017</i>
Last modified:	<i>15 January 2018</i>
Scale:	<i>1:1 @ A4</i>

## Build instructions

- Print out this document;
- Cut around the “hub” (leave about 10mm around it) printout and stick it to a piece of 2.5mm plywood (I used ordinary PVA woodglue);
- Place two more pieces of 2.5mm plywood against it and drill & countersink three of the 3mm holes (marked 1);
- Clamp the three bits of plywood together with M3 screws, washers and nuts;
- Saw around the “hub” shape. You will now have three “hub” shaped bits of plywood sandwiched together;
- Undo the M3 nuts and remove the battery tray piece;
- Replace the M3 nuts and drill and countersink the remaining 3mm countersunk holes (marked 2);
- Drill the four 4mm holes;
- Separate the ply pieces;
- Drill the four 3mm holes on the top hub piece (marked 3);
- Drill out the 3mm holes to accommodate your M3 captive nuts (8 on the bottom hub piece and 4 on the top hub piece);
- Press the M3 captive nuts into the holes;
- Cut around the “Bottom decal” and stick it to the bottom hub piece;
- Cut around the “Battery tray” printout and stick it to the battery tray plywood;
- Saw around the “battery tray” shape;
- Drill the holes in the wooden spars and spacer block;
- Drill a 6mm hole through the centre of the 30 x 30 block;
- Cut down a servo horn and attach it to the 30 x 30 block for the yaw control linkage (see plan);
- Drill appropriate holes in the 30 x 30 block for mounting the rear motor;
- Mark and drill a 5.5mm hole about 20mm into one end of the 470mm spar;
- Drill a 1.5mm hole through the fibreglass rod about 2.5mm from one end (for the R clip);
- Insert the fibreglass rod into the 470mm spar;
- Drill a 2mm hole through the side of the 470mm spar and fibreglass rod and fix a M2 X 20 screw, washers & nut to secure the rod;
- Slide a M6 washer onto the rod, then the 30 x 30 block, then another washer and secure with a R clip;
- Solder connectors & wires to the motors & ESCs as appropriate;
- Attach the motors to the end of the spars with cable-ties (the tail motor attaches to the 30 x 30 block);
- Attach the M3 anti-vibration mounts to the top hub piece;

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Description:	<i>Homemade tricopter</i>
Page:	<i>Build instructions</i>
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Last modified:	<i>15 January 2018</i>
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## Build instructions

- Assemble the hub, spars and spacer block;
- Install the flight controller onto the 4 anti vibration mounts;
- Attach the 9g servo to the servo mount;
- Attach the servo horn and linkage to the servo (ensuring that the servo is centered). You can leave the linkage wire long at this stage and cut it to length later;
- Position the servo mount on the rear spar so that the linkage lines up correctly. Drill the servo mount and spar and fix with appropriate fixings;
- Adjust the linkage as appropriate and attach;
- Connect the motors, ESCs and flight controller together. Do not connect the servo to the flight controller yet as either it and / or the flight controller may be damaged if the servo is connected before the motor layout is configured on the flight controller. The ESCs can be cable-tied to the spars;
- Install the receiver. It can be attached with foam pads or velcro;
- Connect the receiver to the flight controller (5 connections);
- Connect the battery and set up the flight controller;
- Disconnect the battery;
- Attach the servo to the flight controller;
- Attach the propellers to the motors using the prop adapters (tail: CW, port: CW, starboard: CCW);
- Take your Dragonfly out to a suitable area, connect the battery and have fun;
- You will have to make some fine adjustments to the flight controller settings to get it set up just right.

Title:	<i>Dragonfly Mk1</i>
Description:	<i>Homemade tricopter</i>
Page:	<i>Build instructions 2</i>
Author:	<i>Colin S. Barnes</i>
Date created:	<i>1<sup>st</sup> December 2017</i>
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## Parts list

- 2 X 500mm x 15mm x 15mm wood
- 1 X 470mm x 15mm x 15mm wood
- 1 x 30mm x 30mm x 15mm wood
- 1 X 65mm x 15mm x 15mm wood
- 1 X 40mm x 30mm x 15mm wood
- 2.5mm plywood (approx 170mm x 300mm)
- 1 X 55mm length of 6mm  $\varnothing$  fibreglass rod
- 4 X M3 anti-vibration mounts
- 8 X M3 nuts
- 8 X M3 washers
- 2 X M6 washers
- 10 X 20mm M3 Countersunk screws
- 6 X 80mm M3 Countersunk screws
- 6 X M3 Wingnuts
- 6 X 3mm washers
- 6 X 3mm spring washers
- 2 X 6mm washers
- 12 X 3mm captive nuts
- 2 X 4mm X 25mm pins
- 2 X 1.5mm R clips

- 3 X motors ESCs (20A)
- 3 way battery splitter lead
- 2 X CW props
- 1 X CCW prop
- Prop adapters
- Flight controller
- 1 X 9g servo
- Receiver
- 5 X 100mm F – F servo cables

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Title:	<i>Dragonfly Mk1</i>
Description:	<i>Homemade tricopter</i>
Page:	<i>Parts list</i>
Author:	<i>Colin S. Barnes</i>
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## Notes

- When printing this document, if you are using the Visio version it will automatically just print the relevant items on the plan. If you are using the PDF version then print out the pages without all the extra arrows etc.
- Clamping the 3 pieces of plywood together allows you to cut out the two pieces of the hub and some of the battery tray together and ensures that they are the same size. It also ensures that when you drill the holes they line up OK.
- If you are cutting the hub pieces out with a band saw or scroll saw it is useful to add a 4<sup>th</sup> piece of ply to the bottom, countersink the holes and use countersunk M3 screws from the bottom up so that the whole thing sits level on the saw bed and moves easily.
- When drilling the holes in the spars I found it helpful to make a jig to drill the 3mm holes and then to attach each spar to the hub to drill the 4mm holes. This ensures that all the holes line up correctly.
- If you cannot get M3 x 80mm bolts then adapt for larger diameter bolts as required.
- When pressing the captive nuts into the holes it may help to temporarily screw an M3 bolt through them in order to pull them tight.
- When cable-tying the ESCs to the spars, attach them to the rear face so that the spar will afford them some protection.
- Silicone fuel line, aluminium tube or something similar cut to length can be used on the "long" M3 screws that hold the battery tray to stop overtightening of the Wing nuts.

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Title:	<i>Dragonfly Mk1</i>
Description:	<i>Homemade tricopter</i>
Page:	<i>Notes</i>
Author:	<i>Colin S. Barnes</i>
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