BUILDING TIPS

Motor Mount Holes in Firewall:

Four holes need to be drilled (preferably laser cut) to the firewall as in following sketch (note that firewall will be made from 1/8” plywood). The diameter of motor mounting holes must be about 0.140” to accept 4-40 blind nuts (make measurement on blind nuts to be sure, they are in the cabinet!). The thickness of 4-40 blind nuts are exactly 1/8” and, therefore, will be completely embedded in the firewall after installation (provided that you cut the firewall from 1/8” plywood!).

Also note that additional air intake holes must be cut out on firewall to create and airflow inside the fuselage and cool down the ESC (Electronic Speed Controller) during flight. An exit hole must be cut out towards the aft of fuselage, with at least 3 times the total area of intake holes, to create this cool air flow.

Landing Gear Mounting Plate and Holes:

A landing gear mounting plate cut from 1/8” thick plywood must be glued inside the fuselage bottom face (which is from 1/16” plywood) before starting to glue fuselage pieces (particularly the tray). It must be done before everything else because this area will not be accessible after gluing the fuselage faces and battery tray. Four holes must be cut out in the landing gear plate as in following sketch. The diameter of landing gear holes must about 0.172” to accept 6-32 blind nuts (make measurement on blind nuts to be sure!). The thickness of 6-32 blind nuts are exactly 3/16” and, therefore, will be completely embedded in the bottom fuselage after installation (provided that you cut the fuselage bottom plate from 1/16” plywood and landing gear plate from 1/8” plywood!). Also note that you must laser cut the corresponding hole pattern on fuselage bottom plate if you don’t want to drill them later by Dremel tool.

Fuselage Tail:

Upper part of fuselage tail must be parallel to the bottom part of fuselage in the last 2” of the fuselage length. This is required for rudder hinge line to be parallel to the landing gear wire. In the
following figure, left sketch shows the correct geometry. The right sketch, on the other hand, shows what happens when this rule is violated.

Also make sure that you glue an additional 1/16" thick plywood piece inside the fuselage bottom piece where tail wheel bracket is screwed.

Main Wing – Fuselage Fitting:

For high wing design, upper part of fuselage must be shaped to accept the bottom part of main wing. One way of doing this is to copy/paste a FULL airfoil shape onto the fuselage design page as below such that the chord line of airfoil (marked RED below) is initially aligned with the fuselage axis.

Next, you can rotate the airfoil by an angle which is equal to your design angle of incidence. Let’s say that your design angle of incidence is 3°. Then, your airfoil must be rotated by 3° in clockwise direction and seated on the fuselage upper part such that the leading edge (LE) of airfoil is aligned with the fuselage upper line.

As you can see, one important problem arises from this: now the trailing edge (TE) becomes embedded in the fuselage. To prevent this, the fuselage can be reshaped such that the upper line of fuselage aft of wing is aligned with the TE of the airfoil. An example is shown below:
Battery Tray and Servo Tray:

Battery tray houses the Lithium-Polymer (LiPo) battery, Electronic Speed Controller (ESC), Receiver (RX) and other data recording electronics. We want the following two features in the battery tray:

1. Must be a long enough continuous surface to move the battery back and forth to set the CG at the desired point, and
2. Must have side slots through which Velcro tape can be passed to secure the battery in any position we want. An example is shown below.

Also note that the elevation of battery tray from the bottom of fuselage must be just high enough to pass the Velcro tape (e.g., about 0.5”) so that you will have enough room above it to fit the battery and other electronics.

Servo tray houses the servo motors that control rudder and elevator surfaces. The dimensions of the servo holes must be as indicated in sketch to fit the servos we will use (Hitec 225MG servos). NOTE that the same servo bay dimensions will be used for aileron servos to be fitted into the bottom of main wing.

An important difference between battery tray and servo tray is that the servo tray must sit at a higher position than the battery tray to create enough clearance for the servo motors.
Camera Plate and Flight Camera:

I will provide you with a camera plate with built-in screw holes. That will be glued just in front of the landing gear block/plate. Its size is 2.5”x3.5”. Weight of the camera to be attached to your plane is exactly 177g. The existence of camera will change the CG location of your plane because it will be positioned ahead of the wing leading edge.

Data Recording Unit:

We will add FDR-PRO data recording unit into your plane just before the flight to record airspeed, altitude, motor RPM, battery voltage and current draw from the battery. The total weight of data recorder is 67g including the sensors and extension wires. It will be placed on the Velcro tape on your battery tray somewhere close to your CG point. So, although its existence will increase your overall weight of plane it is not expected to alter the CG location of plane.