Construction Of Ken Myers' Modified Simple Cub

How to download, print and assemble the plan sections for my modified Flite Test Simple Cub are found at the end of the article "Introduction, Techniques and Tools for Ken Myers' Modifications to the Flite Test Simple Cub".
http://theampeer.org/Kens-Simple-Cub-v5/Construction/Kens-Introduction-to-FT-Cub-Mods.pdf

The following is the **strongly recommended order** for printing and assembling the plans.

Join the Pages to Form a Complete Plan Section for Each PDF File

1. Download, print and assemble the Doubler.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/Doubler.pdf
(This PDF file plan was used as the example at the end of the "Introduction, Techniques and Tools for Ken Myers' Modifications to the Flite Test Simple Cub". Specific directions on how to assemble the plans are included in the "Introduction" PDF.
http://theampeer.org/Kens-Simple-Cub-v5/Construction/Kens-Introduction-to-FT-Cub-Mods.pdf)
This plan section contains the front fuselage doublers (foam board), window templates, my middle landing gear tab template (for 3/32" plywood), my battery protector (foam board), and my fuselage front bottom (foam board).
[3 pages and 2 cuts]
Assemble the plan section created from the Doubler.PDF file, as described in the "Introduction" article, and set aside.

2. Download, print and assemble the H-Stab.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/H-Stab.pdf
This plan section contains the horizontal stabilizer and elevator unit (foam board), landing gear wire template (3/32" music/piano wire), rear fuselage doublers (foam board), and the two (2) FT dihedral gauges (foam board)
[3 pages and 2 cuts]
Assemble the plan section created from the H-Stab.PDF file and set aside.

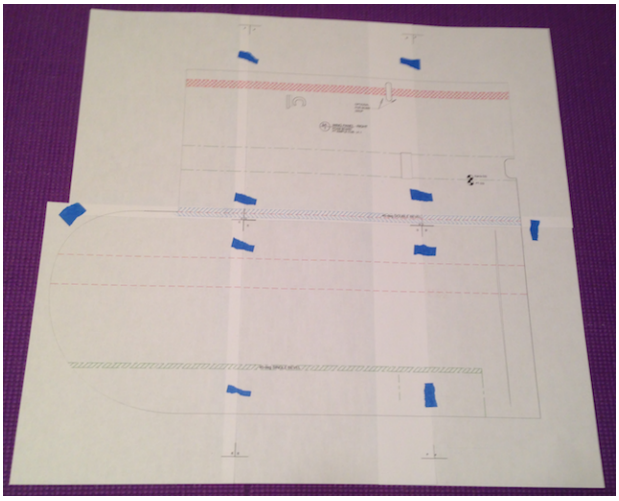
3. Download, print and assemble the Power-Pod.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/Power-Pod.pdf
The plan section contains the power pod (foam board), right triangle (foam board), firewall template (for 1/8" plywood), and two (2) throw gauges (one with 12-deg and 16-degrees and one with 12-deg and 24-deg)

[3 pages and 2 cuts]
Assemble the plan section created from the Power-Pod.PDF file and set aside.

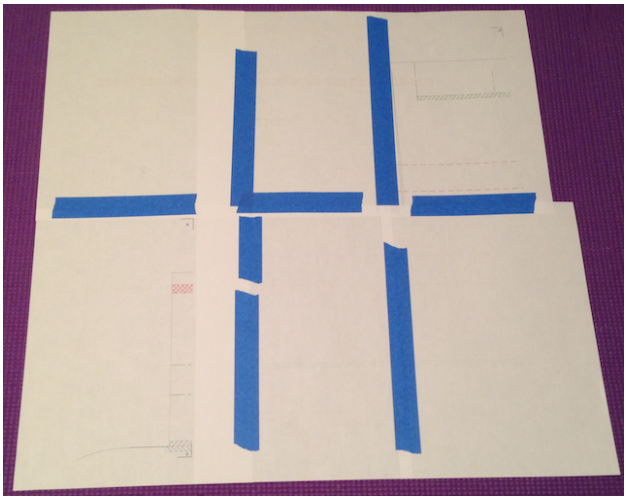
4. Download, print and assemble the Spar.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/Spar.pdf
The Spar.PDF plan section contains the wing spar (foam board), rear fuselage bottom (foam board), and the top hatch (foam board)
[3 pages and 2 cuts]
Assemble the plan section created from Spar.PDF file and set aside.

5. (**OPTIONAL** if desired) Download, print and assemble the Lightning.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/Lightning.pdf
The plan section contains the template for the two lightning bolts, two landing gear fairings (foam board) and the FT landing gear tab (foam board), which is optional if Ken's modified plywood landing gear tab is not used.
[3 pages and 2 cuts]
Assemble the plan section created from the Lightning.PDF and set aside.

6. Download, print and assemble the RWP.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/RWP.pdf
The plan section contains only the right wing panel (foam board)
[6 pages and 5 cuts]
Assembling the plan section for the RWP.PDF is slightly different.
Assemble the top three sheets in a similar manner to the previous PDF file plans. Once the three sheets are assembled, use the horizontal alignment marks, C and D, to cut the bottom off the assembled sheets.
Assemble the bottom three sheets
Lay the previously assembled top three sheets over the bottom three sheets. Align and painters tape in place.
Turn the six sheets over and tape the seems between the sheets.



RWP front
Set aside.

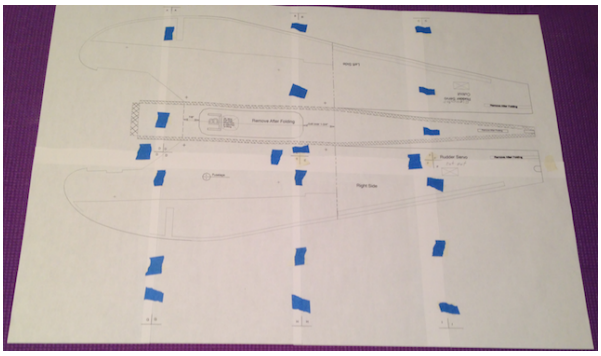


RWP rear

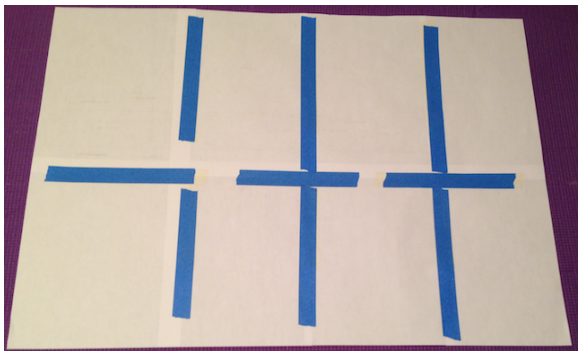
7. Download, print and assemble LWP.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/LWP.pdf
The plan section contains only the left wing panel (foam board)

[6 pages and 5 cuts]
Assemble in a similar manner to the right wing panel and set aside

8. Download, print and assemble the Fuse.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/Fuse.pdf
The plan section contains only the fuselage (foam board)
[8 pages and 7 cuts]



Front of fuselage sheet



Rear of fuselage sheet

Assemble in a similar manner to the wing panels, except that there are 4 pages across each row, instead of three and set aside.

9. Download and print the V-Stab.PDF
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/V-Stab.pdf
The plan section contains the vertical stabilizer and rudder and the small triangles for the rear, bottom of the wing center section reinforcement.
No cutting or joining is necessary as everything prints out on one sheet of paper.

10. Print the Layout.PDF.
http://theampeer.org/Kens-Simple-Cub-v5/Construction/All-PDF-files/Layouts.pdf
The layout print files are used as an aid for laying out the parts on three pieces of Dollar Tree Foam Board.

Cut Out the Individual Parts Templates

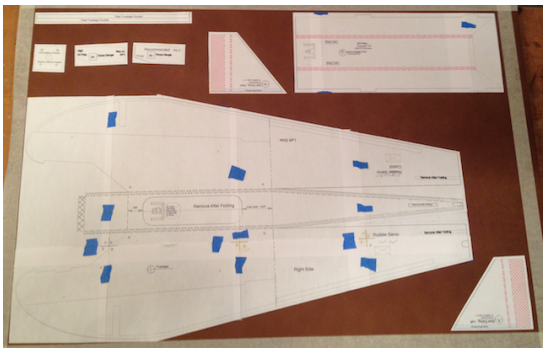
Items Required: All nine printed plan/template sections and the 3 Layout Sheets, 3 sheets of Dollar Tree Adams Readi-Board, scissors.

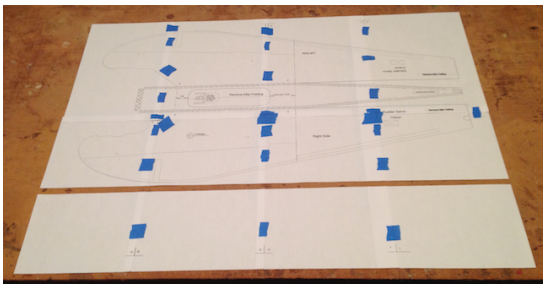
Use scissors to cut out the individual paper parts templates from the printed plans.

Warning! DO NOT CUT OUT THE PAPER PARTS TEMPLATES ON THEIR PART LINES.

Cut out the individual part's template about 1/4" away from the template's most outside lines.

The fuselage template is an exception to the 1/4" recommendation. The layout photo shows the parts for Layout Sheet 1 represented on a sheet of Readi-Board. (For the photo, an area representing a piece of foam board was created on a large piece of wood.)





The rear of the fuselage template does not need to be cut to 1/4" away from the actual cut lines, as shown in the photo.

The 2nd photo shows the bottom of the fuselage template cut off so that the template is a rough rectangle. That is all that needs to be done before affixing the fuselage template to the foam board.

While cutting out the part's templates, group the individual parts templates into three sets for the three pieces of foam board. Use the printed layout sheets as a guide.

Set all three groups of the individual parts templates aside.

The following templates, are not used for foam board parts; the firewall, my middle landing gear tab plate, the landing gear wire template, the windows template (if they are going to be used), the lighting bolts template (if it is going to be used). They can be set aside separately as a fourth group.

Cutting Out the Foam Board Parts and Some Pre-assembly

Note: A cheap yoga mat makes a good cutting surface.

WARNING: DO NOT REMOVE ANY OF THE PAPER PARTS TEMPLATES FROM THE FOAM BOARD UNTIL NOTED TO DO SO.

When cutting out the part from the whole piece of Dollar Tree foam board, first cut out the whole outline of the part. Set the sheet of Dollar Tree foam board aside if the part needs further work such as adding holes, slots and/or more cuts.

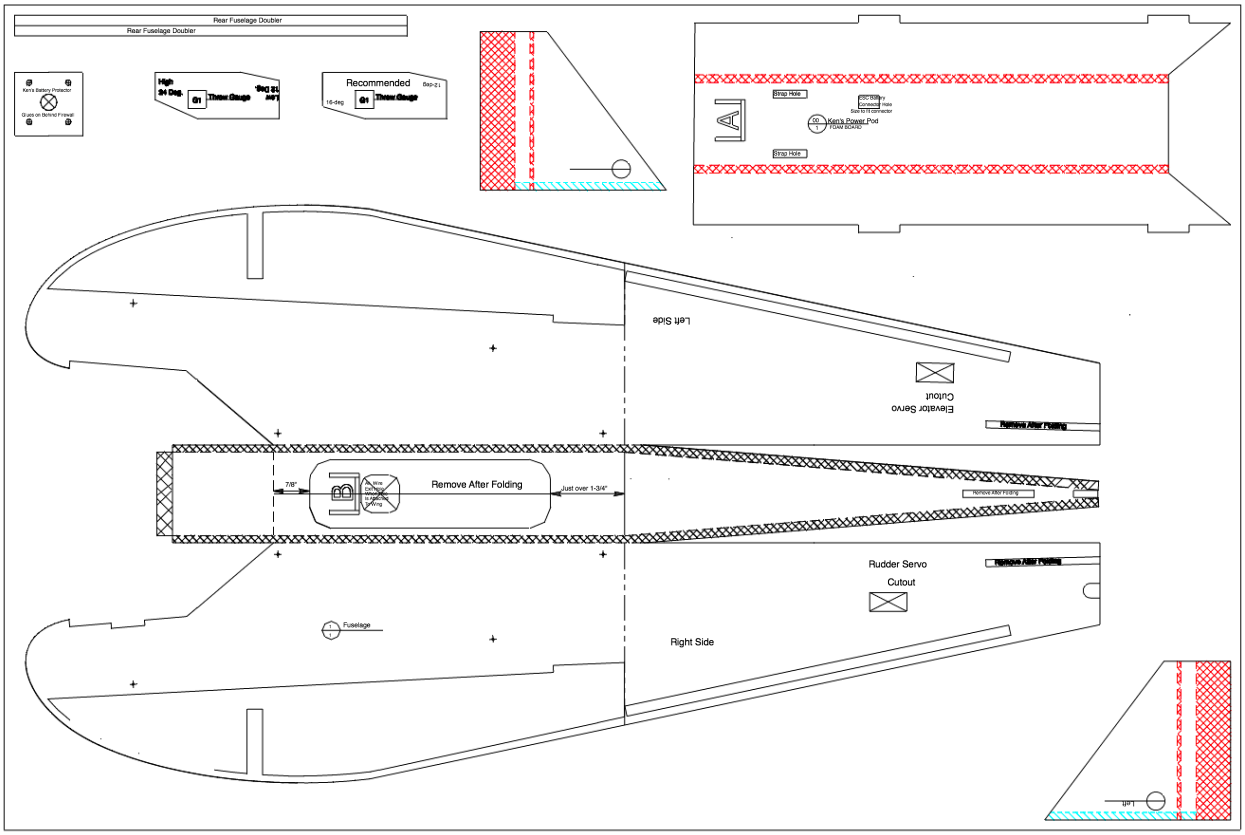
If the part requires further work, painters tape can be used to hold the part to the cutting surface to finish any other cuts that are to be made in the individual part.

THERE ARE A FEW EXCEPTIONS AND THEY ARE NOTED WITH THE NOTES FOR THAT PART. PLEASE WATCH FOR THE EXCEPTIONS IN THE NOTES.

Use the parts **Layout 1** diagram as a guide to affix the individual part's templates to a sheet of foam board in the noted location. Use Elmer's Disappearing Purple Washable School Glue to affix the part's template to the foam board. Glue on only one part template at a time. If nothing else needs to be done, set that part aside after it is cut out and then cut out the next part. If something else needs to be done to finish up the part, finish that part and then set it aside.

The following is the **highly recommended order**.

1. Using Elmer's Disappearing Glue, glue the template in place for the **two rear fuselage doublers**. The template is cut into two pieces to make the two rear fuselage bottom doublers.



Cut the three long horizontal lines first and then the two vertical lines.

Once they are separated into two 1/4” wide by approximately 9.5” long pieces, remove the template paper and set them aside.

2. Return the sheet of DTFB to the cutting surface, affix and cut out the **battery protector**.

Set the DTFB piece aside.

By hand, run a 3/32” drill bit through the centers of the five holes and then a 1/4” drill bit through the center hole, which was predrilled with the 3/32” bit.

Gently pull the template paper back from the top of the printed paper template enough to use a fine line marker to write the word TOP at the top of the foam board piece and then pull off the template paper.

Set the part aside.

3. Return the sheet of DTFB to the cutting surface, affix and cut out the two **throw gauges**.

While removing the paper templates from the throw gauges, use a fine line marker to note the angles on the part.

Set them aside. (Why two gauges are cut will be explained later.)

Note: The process of cutting, and then completing a part before continuing should be apparent by now. I will not repeat, put the DTFB sheet back on the cutting surface, etc.

Extremely Important Note Regarding What the Construction Exes (XXX) Mean on the Paper Parts Templates.

There are several areas, on specific parts, that need the top paper layer and the foam itself removed from the part, while leaving the bottom layer of paper intact. Those areas are annotated with exes (XXX) between two parallel dashed lines.

When making the 50% deep cuts on the parallel dashed lines, with the exes between them, align the metal ruler on each of the parallel dashed lines on the inside of the area. That means that the exes are covered by the metal ruler and can't be seen when making the 50% deep cut. Turning the part around on the cutting surface makes this easier.

Extremely Important Note Regarding Making 50% Deep Cuts
In several places, the construction notes indicate where cuts are to be made approximately 50% of the way into the foam board and not all the way through the foam board.

A 50% deep cut is actually a two-step process, even though it is only noted it as one step and the notes say something like, "Make a 50% deep cut…".

The idea behind a 50% deep cut is to leave the paper on the bottom of the foam board intact.

To get the 50% deep cut deep enough, without going through the paper on the bottom of the foam board, make the 50% deep cut with a single edge razor blade and then **use a brand-new single edge razor blade**, **with the safety wrap left on it**, and run the exposed, blunt edge of the NEW, safety wrapped, single edge razor blade through the 50% deep cut before removing the metal ruler. Wrap painters tape around the safety wrap on the unwrapped single edge razor blade to keep the wrap from separating and coming off.

That procedure allows the bottom paper to stay intact and the cut to be deep enough to allow the foam to "break" apart on the cut line or allow the top paper and all of the foam to be easily removed when forming channels in the foam for folds or removing sections of foam from edges of the part.

4. (Optional if used) **Right Landing Gear Fairing**

Watch the part of the Flite Test build video showing how to make and attach the optional Gear Fairings.

Flite Test Build video regarding the landing gear fairings.
https://youtu.be/Uw0_9Zmcewc?t=4282

If the fairings are going to be used, cut out the outline of the template for the landing gear fairing.

HINT: Even if the landing gear fairings are not going to be used, they can be cut out and used for practice in making 50% deep cuts. Both of the purposes for using 50% deep cuts are used on the fairings.

Use painters tape to hold the part to the cutting surface while doing the following.

Make two 50% deep cuts for the landing gear wire channel. The two cuts create a narrow channel for the landing gear wire to run through.

Make a 50% deep cut where the large area of exes are. The top paper and foam will be removed from the area where the exes are. Once the top paper and foam is removed from that area, it creates a large, fold-over tab.

Along the blue line, cut only through the paper template and top paper of the foam board.

Remove the small strip of template paper and top paper of the foam board from the small strip.

Use a sanding block, with fine sandpaper on it, to sand a 45-deg angle on the exposed foam where the blue strip of paper was removed.

Hint: This is also another technique worth learning, as it is used in several places later in the construction.

Over the edge of the building surface, “break” the foam between the landing gear wire groove and remove the top layer of paper along with the foam from the landing gear wire cavity.

Remove the top layer of paper and foam board from the large tab at the front of the fairing. That leaves only the bottom paper which forms a large, fold-over tab.

Remove the rest of the paper template and set the part aside.

Repeat the process for the **left landing gear fairing**. (Not necessary if the landing gear fairing is not going to be used.)

5. Cut out the outline of the template for the **power pod**.

Use the single edge razor blade and hobby knife, with a #11 blade, to cut the horizontal and angled lines first and then the vertical lines.

Note: The power pod **DOES** have right thrust built into it. The front of the power pod requires cutting three (3) lines. It is NOT a straight cut!

Use a a hobby knife, with a #11 blade, to cut out and remove the ESC battery connector hole and the holes for the two slots for the Velcro battery strap on the power pod. Be sure the hole for the battery connector fits the connector used on the battery/batteries that you will be using.

Tape the part to the cutting surface so that it can’t move while cutting.

Use a single edge razor blade and metal ruler to cut 50% deep cuts on the horizontal lines on the foam area to be removed, where the exes are, between the two sets of parallel lines.

Remove the template paper.

View this part of the Flite Test build video for an explanation of how to assemble the power pod.
https://youtu.be/Uw0_9Zmcewc?t=111

After the whole part has been cut out, “break” open the slots and remove the foam board between the lines, leaving only the bottom paper.

Place a new sheet of foam board on the work surface. The new sheet is for Layout 2, which contains the 90-deg triangle tool. Affix the triangle printed template in the lower left corner of the foam board sheet for Layout 2.

Cut out the 90-deg triangle tool.

Set the foam board for Layout 2 aside.

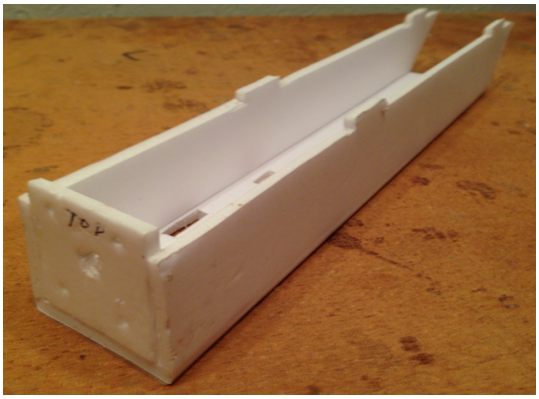
Remove the template paper from the triangle.

The triangle, foam board power pod and the battery protector are used to preassemble some of the power pod.

This part of the FT video shows the assembly of the power pod.
https://youtu.be/Uw0_9Zmcewc?t=193

The foam board piece for the power pod uses an “A” fold for the sides. Both sides of the power pod bottoms sit on the top of the floor and are Tacky Glued into place at a right angle to the floor.

Run a bead of Tacky Glue on the bottom of one side and fold as shown in the video. Use the 90-deg triangle to “square” the side of the power pod and pin the side at 90 degrees to the floor.



Repeat for the other side.

The battery protector sits on, and is glued to, the floor and sides of the power pod and between the sides at the front of the power pod. The battery protector is Tacky Glued and pinned into place at the front of the power pod, on the top and sides, and flush with the end of the sides.

The photo shows the pre-assembly completed on the power pod.

Set the somewhat preassembled power pod and triangle aside.

6. **Note:** The **fuselage** is the most tedious and time consuming individual part to cut out and prepare. Take your time. Have the Elmer’s Glue stick handy. It is imperative that the fuselage template stays in place on the foam board. If any of the template paper starts lifting, immediately glue it back into place.

Cut out the complete outline of the fuselage template.

Note that the lines at the rear of the fuselage top are angled to a short straight line at the small cutout for a rudder tab. Cut the short straight lines and two angled lines with a #11 blade.

Align the metal ruler to the lines at the end of the fuselage sides. Make the cut from all the way from one fuselage rear past the other, starting before one side of the fuselage and ending after the other.

Finish cutting out the template outline for the fuselage. **DO NOT CUT OUT the lines for the landing gear slot.** They are on the template only so that alignment lines can be transferred to the foam board using a straight pin to prick into the foam board and later be marked on the foam board with a fine line marking pen.

Transfer the construction alignment lines for the front and rear fuselage doublers.

Use a straight pin to make pin pricks into the foam along the line at the top of the front doubler. The pin pricks should not go all the way through the foam board, just into it. Wiggle the pin a little to enlarge the pin prick hole slightly.

Place the pin pricks about 1" apart on the long, straight lines at the top of the front fuselage doublers. Pin prick the lines for both front fuselage doublers.

Pin prick the lines for the landing gear tab. Place the pin pricks about 1/4" apart. Again, when the pin pricks are connected, they will be visible just inside the landing gear tab on the actual doubler. Do the pin pricks for both landing gear tab alignment lines.

Follow the same procedure for the top line of the rear fuselage doublers. Place the pin pricks about 1" apart. Do the lines on both fuselage sides.

For the center line on the cabin top cutout, place the pin pricks about 1/2" apart.

All of the pin pricks will be visible on the foam board once the paper template has been removed. Do NOT remove the template paper yet!

Create grooves on the vertical lines at the rear of the cabin area on the fuselage sides, but not the fuselage top. Use a Frearson screwdriver to create the grooves.

To create the grooves in the foam board fuselage sides, offset the metal ruler so that the point of the Frearson screwdriver can be drawn down the dashed line. Use a bit of pressure on the screwdriver to create the grooves. The grooves allow the fuselage to bend at that line towards the rear of the fuselage when it is assembled. The metal ruler can be laid along both fuselage dashed lines at the same time, and the screwdriver pulled on both fuselage sides. Remember that NO Groove is needed in the fuselage top.

Use the same grooving technique to groove the dashed line on the fuselage top at the front of the fuselage where the windshield bends down.

DO NOT REMOVE ANY CUTOUTS FROM THE FUSELAGE AT THIS TIME!

A Note About Temporarily Using Painters Tape on the Foam Board to Hold Parts in Place
When using painters tape on foam board, to hold something in place, make a small fold over, at one end of the tape, sticky side to the sticky side, to make a tab to easily pull the tape off later.

To hold slots and holes in place, turn the foam board over and use painters tape on the slots and holes just cut. This holds them in place. The slots and holes are removed AFTER the fuselage is assembled.

Cut the slots, at the rear of the fuselage sides, for the horizontal stabilizer and the two holes on the fuselage top for the tabs on the vertical stabilizer. Cut the little “half oval-like” control horn allowance slot on the right side of the fuselage. Do NOT remove the cutouts!

Turn the fuselage part over and use painters tape to hold the cutouts in place.

Cut the servo holes, but do not remove the cutout material at this time. Turn the fuselage over and painters tape the servo cutout holes in place.

If ailerons are to be used in the wing, cut the access hole in the cabin top cutout. Later this part is used on the wing and the hole allows the servo leads to enter the cabin from the wing.

Cut the large cabin access hole in the fuselage top. Do not remove. Use the same technique as the previous cuts, as it will be removed later. The paper template for the cutout will come off at this time.

During assembly, the fuselage sides are to be folded outside the fuselage top. The sides end up beside the top of the cabin. This is called a “B” fold.

Make a 50% deep cut line on the dashed lines near the exes from the front of the windshield to the rear of the cabin area.

Make a 50% deep cut line on the dashed lines near the exes from the rear of the cabin area to the rear of the fuselage.

Repeat on the other side of the fuselage top.

Make a 50% deep cut on the line near the inside bottom of the windshield.

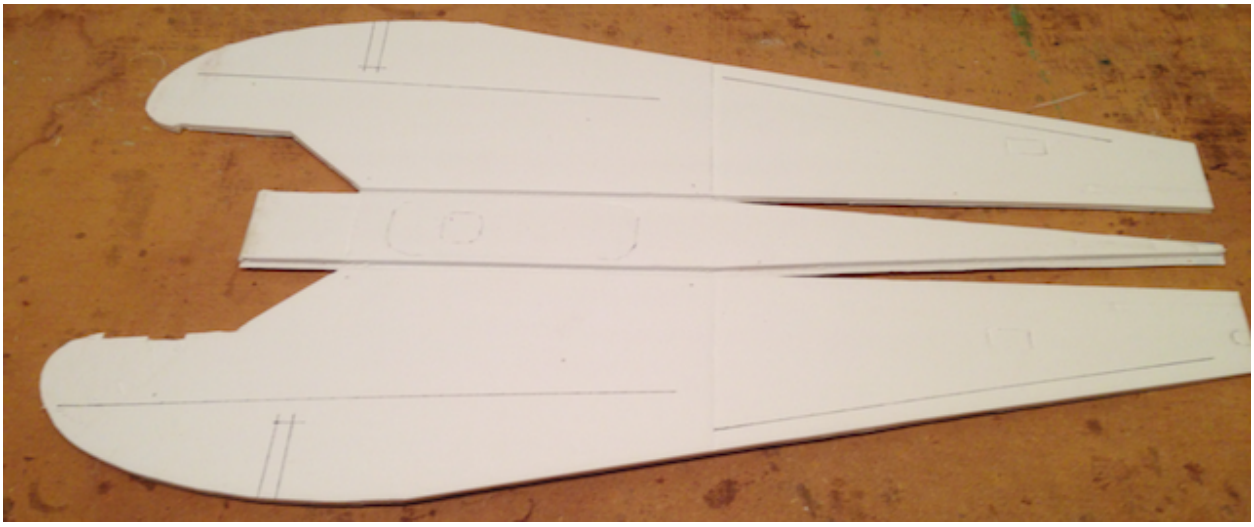
Use a 1/16” drill bit, by hand, to pre-drill the holes for the wing hold down wooden dowels and the dowels that will go through the power pod. There are four plus (+) signs on each fuselage side. The plus signs on the fuselage template indicate where to drill.

Remove the paper template from the fuselage.

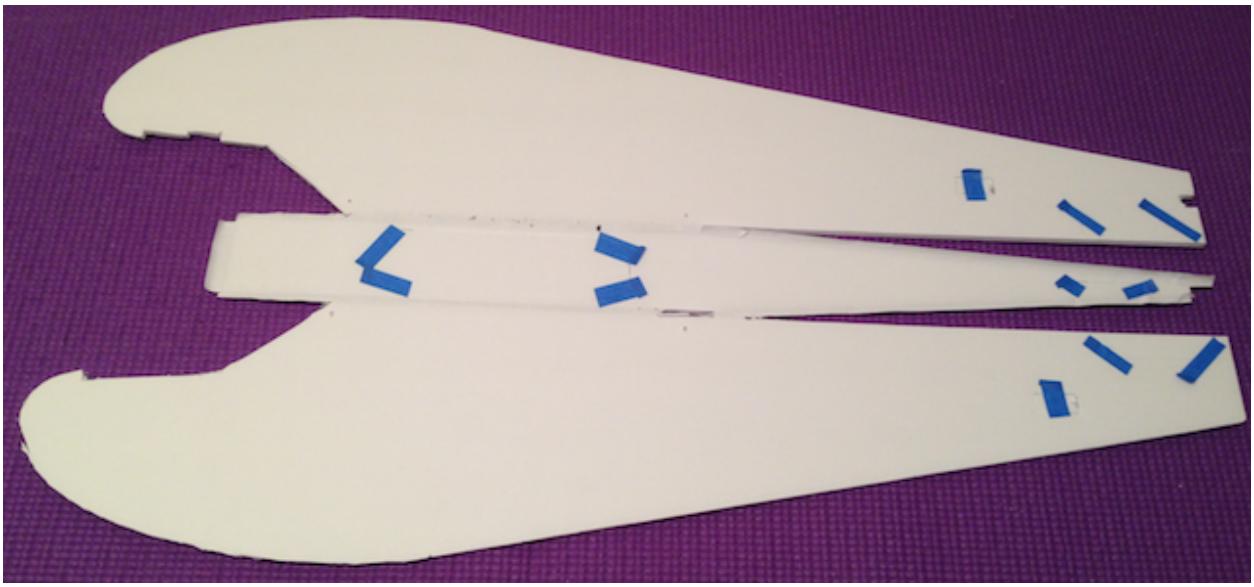
View this part of the Flite Test video to see what needs to be done now.
https://youtu.be/Uw0_9Zmcewc?t=2080

Remove the strips of foam from areas of the fuselage as shown in the video.

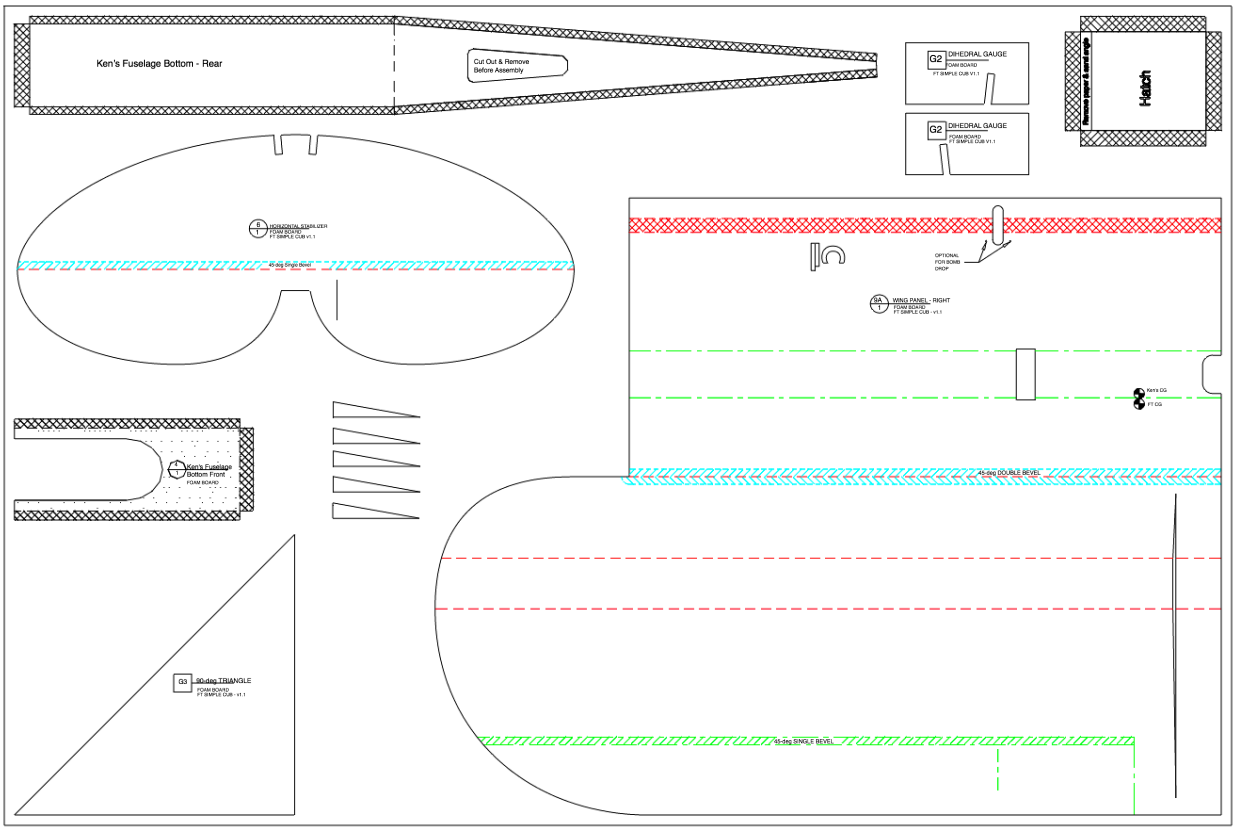
Spread Tacky Glue on the fold-over tab on the windshield bottom and fold over that tab onto the bottom of the windshield and press down.



Use a metal ruler and fine line marker to mark all of the alignment lines, on the inside of the fuselage, by connecting the dots made by the pin pricks. Don't forget the center line on the cabin top cutout!
The inside of the fuselage sides and top are shown in the photo. The alignment lines for the doublers and landing gear tab can be seen. I forgot the centerline for the cabin top cutout. It was put on that cutout when that cutout was removed from the fuselage.
When the fuselage preparation is finished, the backside (outside) looks like the photo, except that the paper tab at the bottom of the windshield has already been folded over and glued.



Set the fuselage aside.



Layout 2: Return the Layout 2 piece of foam board to the cutting surface. (The 90-degree triangle was already cut out of this piece of foam board.) Use Elmer's School Glue to affix each individual part template to the sheet of foam board. Glue on only one template at a time and then cut it out in the noted order.

1. The rear of the **rear fuselage bottom** has two, short, angled lines and a short straight line. Use a #11 blade to cut these lines first and then cut out the rest of the template's outline.

Cut out the air exit hole, but leave it in place and put painters tape on the backside of the part to hold it in place.

Use the Frearson screwdriver to make a groove along the dashed line, similar to the way the groove was made on the fuselage.

Also on that same dashed line, cut through the top layer of paper on the foam board only, where the groove is.

Cut 50% deep cuts on the dashed lines near the exes.

Remove the foam board around the edges of the part leaving only the bottom paper.

Remove the printed template.

Remove the top paper on the foam board from the groove, with the cut in it, to the front of the rear fuselage bottom.

This part of the Flite Test video shows the paper to be removed.
https://youtu.be/Uw0_9Zmcewc?t=2246

Fold over and Tacky Glue the fold-over tab at the front of this piece.

Set the finished piece aside.

2. Cut out the **two dihedral gauges**. Remove the template paper and set aside.
Note: These pieces can be used. I prefer to use an alternate method noted during the wing construction.

3. Cut out the outline for the **hatch** template.

Cut 50% deep lines on the dashed lines near the exes on all four sides of the hatch.

Cut only the template paper and the top layer of paper on the foam board on the the line under where its says “Remove paper & sand angle.” That is the line towards the inside of the hatch.

Remove the foam board from around the hatch leaving only the bottom paper.

Remove the narrow strip of top paper at the front of the piece to expose the foam.

Fold the front bottom paper under the part and sand the foam to about a 45-deg angle on the front of the hatch using the exposed foam as a guide. The angle will then closely match the angle on the windshield.

Remove the rest of the printed paper template.

Fold and Tacky Glue the four paper tabs onto the bottom of the part.

Set the part aside.

4. Cut out the outline of the **horizontal stabilizer/elevator template**.

Cut a 50% deep cut on the red line on the rear of the area where it says “45-deg single bevel”.

Cut the blue line only through the template paper and and the top paper layer of the foam board.

Remove the narrow top strip of template paper and the paper on the top of the foam board from the foam.

Remove the paper template.

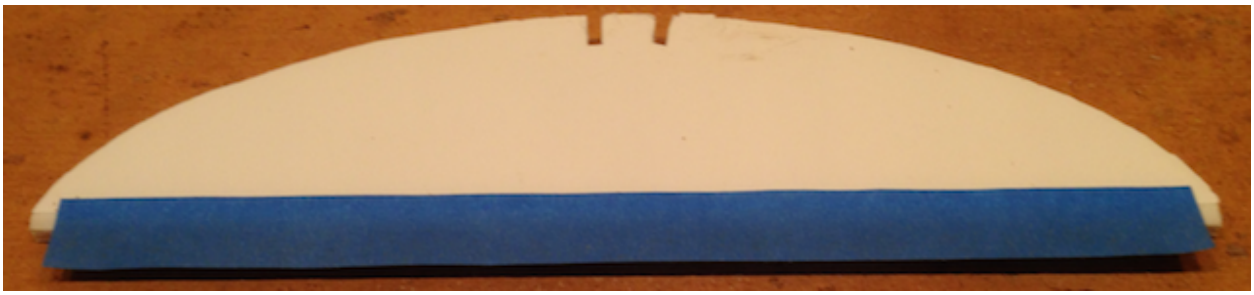
“Break” the line between the elevator and horizontal stabilizer.

Fold the elevator under the top of the horizontal stabilizer.

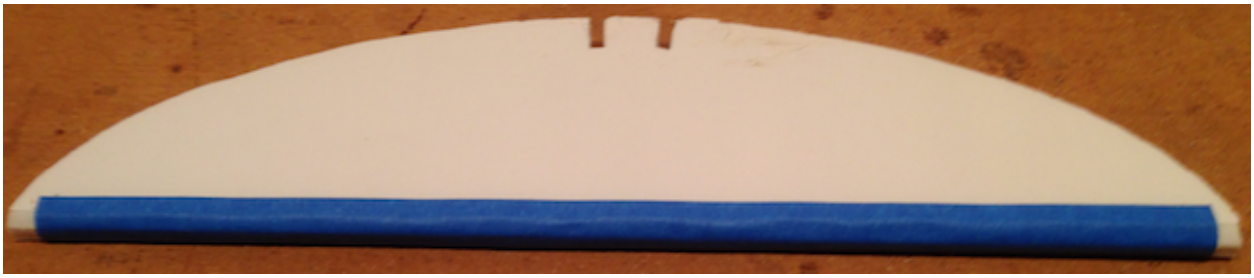
Painters tape can be used to hold the elevator to the horizontal stabilizer.

Use a sanding block, with fine sandpaper, to sand a 45-deg angle between what was the blue line and the “break”. The exposed foam acts as a sanding guide.

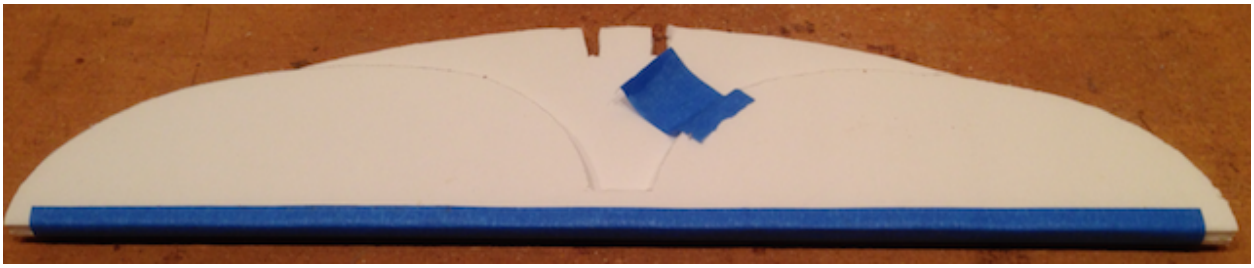
Cut a 12.5” piece of **filament tape** to make the bottom hinge.
Note: Painters tape was used for photographic purposes. **USE FILAMENT TAPE!**



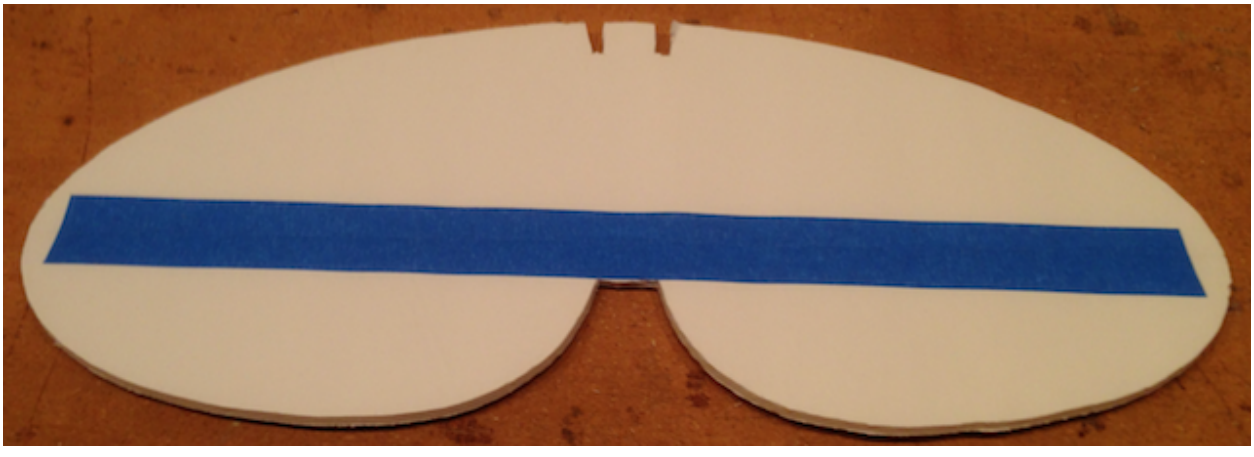
Apply the filament tape starting at about 1/2” from the outside end of the horizontal stabilizer.



Overlap the tape about 1/4” onto the horizontal stabilizer and fold it around the beveled edge and onto the bottom of the elevator.



Turn the horizontal stabilizer/rudder over and remove the painters tape holding the elevator to the horizontal stabilizer.



Cut a 12.5” piece of **filament tape** to make the top hinge.

Apply the tape starting about 1/2” from the outside end of the horizontal stabilizer. The tape should be aligned to completely cover the small, straight area between the two elevator halves.

To keep the top and bottom paper of the foam board from lifting, run a bead of Tacky Glue on the exposed foam around the perimeter of the part. Use a finger to spread the glue on the foam board edge so that it is on the exposed foam and the exposed edges of the paper.

Clean the finger with water and a rag.

Set the part aside.

5. Cut out the outline of the **front bottom piece**.

Cut the large “slot” at the front of this piece first and then the rest of the outside lines of the template.

Make 50% deep cuts on the three dashed lines near the exes.

Remove the foam board from the edges of the part. Leave only the bottom paper.

Remove the paper template.

Remove the top paper from the foam board. This allows the part to bend more easily when it is glued into position.

This part of the FT video shows the top layer of paper being removed from this part.
https://youtu.be/Uw0_9Zmcewc?t=2237

Use Tacky Glue to glue the bottom paper tab fold over in place.

Set aside.

6. Cut out the **5 triangles** that are used to reinforce the rear, bottom, center section of the wing. These parts are very small. Put a piece of painters tape across them before cutting them out.

Remove the printed paper templates.

Set the triangles aside.

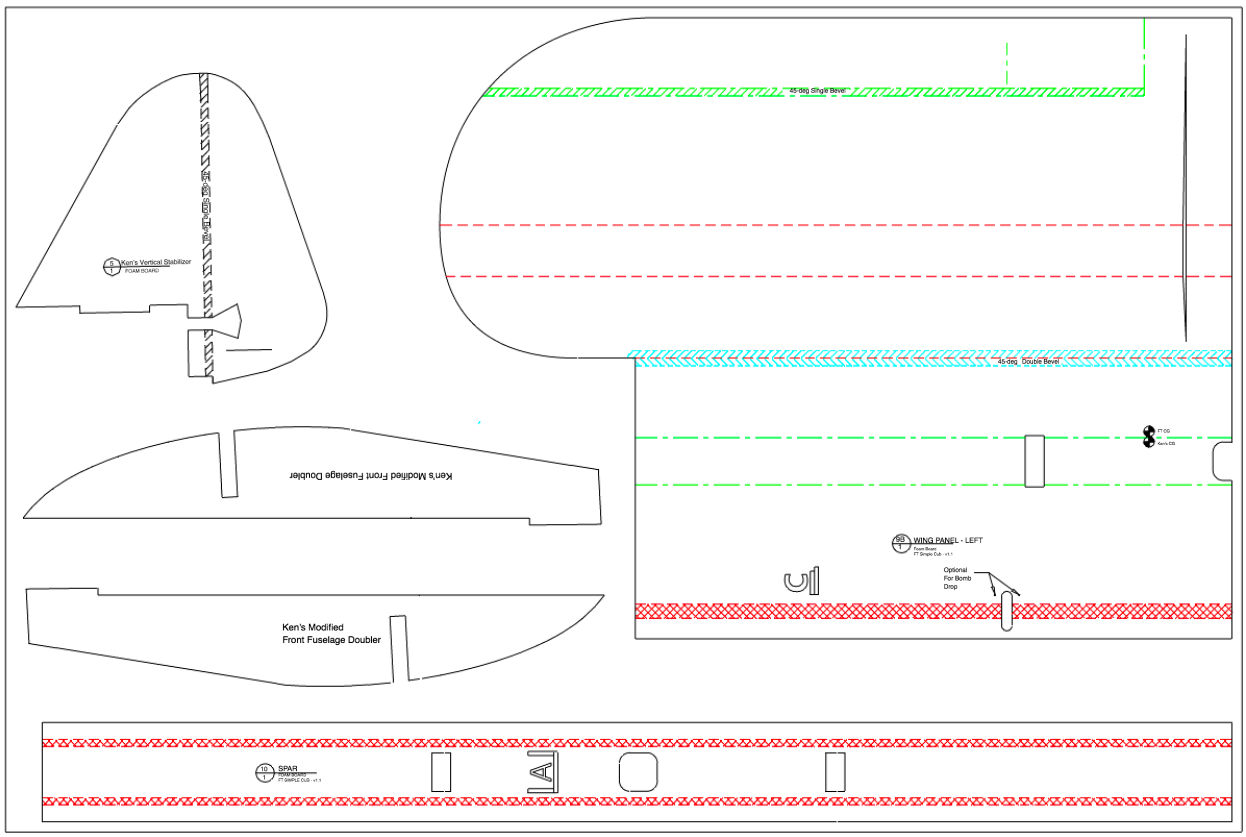
An Important Note About Cutting Out the Wing Panel Templates!

Both wing panels are the EXCEPTION when cutting out the templates’ outline. The horizontal lines are **NOT cut** when cutting out the outline for the wing panels. Cut ONLY the outside vertical lines and wing tip outlines.

7. Cut the outside vertical lines and wing tip outline for the **right wing panel**.

DO NOT REMOVE THE PAPER TEMPLATE.

Set the right wing panel aside.



Use the **Layout 3** diagram to affix the individual parts templates to a new sheet of foam board, using Elmer's School Glue, one template at a time.

1. Cut out the template for the vertical stabilizer and rudder.

50% deep cut the **Vertical Stabilizer/Rudder**'s rear most vertical line, located over the top of the words "45-degree Single Bevel".

Cut the front vertical line, below the words "45-degree Single Bevel", just enough to cut through the template paper and the paper on top of the foam.

Remove the template paper and top layer of paper on the foam so that the foam is exposed in the slot just created between the two cuts.

'Break' and then fold the rudder over the right side of the vertical stabilizer. Hold the rudder in place with painters tape. Lay the unit near the edge of the building surface and sand about a 45-deg angle, using the exposed foam as a guide.

Remove the tape and paper template.

Cut a 5" and 3/4" piece of **filament tape**. Use the tape to make the hinge between the vertical stabilizer and rudder, just as for the elevator.

Start the 5” piece of filament tape about 1/2” from the top of the rudder. Overlap the tape about 1/4” and apply. Apply the 3/4” tape to the bottom of the rudder and its tab that goes into the fuselage.

To allow the tab, at the bottom of the rudder, to easily slide into it slot at the rear of the fuselage, under the horizontal stabilizer, pinch the tab to compress the foam.

To keep the top and bottom paper of the foam board from lifting, run a bead of Tacky Glue on the exposed foam around the perimeter of the part. Use a finger to spread the glue on the foam board edge so that it is on the exposed foam and the exposed edges of the paper.

Clean the finger with water and a rag.

Set the part aside.

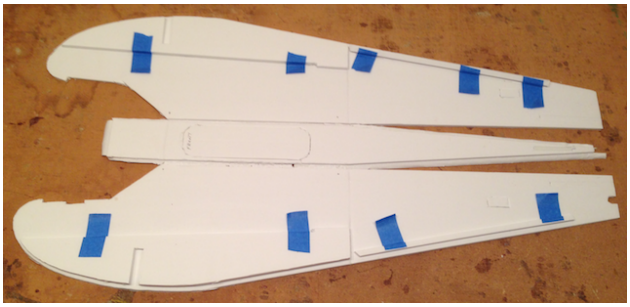
2. Cut out both of the front **fuselage doublers**. Remember to cut the slots for the landing gear tab. Cut the straight lines first and then the rounded bottoms. Don’t forget to cut the slots for the landing gear tab. (Yeah, I said that twice. Guess why?)

Set the Layout 3 sheet of foam board aside.

Remove the paper templates from the doublers.

Align the two doubler parts over each other. Use the long top line and the landing gear slots to align them. Once aligned, pin the doublers together. Use a sanding block to sand the two doublers to identical shape.

Set the fuselage and the front and rear doublers on the work surface.



Spread Tacky Glue on the back of one of the rear doublers. Align the top of the rear doubler with the alignment line on the fuselage and the of the front of the doubler just behind the groove behind the cabin. (The photo shows tape on the rear doublers, but I’ve now omitted that. Just pinning the rear doublers in place is fine.)

Use the width of the long, straight line on the top of the front fuselage doubler as a thickness gauge to get the correct spacing between the bottom of the rear doubler and the bottom of the fuselage.

Use straight pins to hold the rear doubler in place.

Repeat for the other rear doubler.

Align the top of the front doubler with the front doubler alignment line on the fuselage and the landing gear tab slot on the fuselage.

Once satisfied with the alignment, use two straight pins to temporarily hold the alignment.

Temporarily tape the front doubler to the fuselage side with two pieces of painters tap to hold it in place.

Remove the two straight pins.

Fold the doubler over, while still connected with the tape (See the photo again). Use Tacky Glue, spread with a finger, to cover the backside of the front doubler. Once the glue is on the backside of the doubler, fold it back over into position and press down firmly.

Clean the finger with water and a rag.

Repeat for the other front doubler.

On a flat surface, place weights, like soup cans, on the front doublers.

Allow the glue to dry on a flat surface.

3. Cut out the spar template outline.

When working on the **wing spar**, if ailerons, or the bomb drop, are to be used, the holes in the spar need to be cut out and removed. (optional - the holes are not needed for the 3-channel version.)

Flite Test's video on spar assembly.
https://youtu.be/Uw0_9Zmcewc?t=1151

50% cut the horizontal red lines on the inside of the foam area to be removed, for the wing spar, where the exes are.

Remove the foam between the parallel lines leaving only the bottom paper.

Assemble the spar on a flat surface. The spar uses an "A" fold, which means that the sides go on top of the bottom piece of the spar.

Run Tacky Glue along the bottoms of the sides. Use pins, as necessary, and pin the sides at 90 degrees on the top of the spar bottom.

Equally space 5 soup cans along the spar. Use a 90-deg triangle to align the sides to 90 degrees and adjust the soup cans to hold the sides in place at 90 degrees.

Set aside on a flat surface and let the glue dry.

4. Cut the outside vertical lines and wing tip outline for the **left wing panel**. Do NOT cut the two horizontal lines at this time

DO NOT REMOVE THE PAPER TEMPLATE.

Set the left wing panel aside.

Assembly

Wing Construction

WARNING: The printed paper templates MUST remain on the wing panels. If any areas of the printed templates start to lift, immediately use the glue stick to glue them back down to the foam board.

1. Lay the wing panels, with the paper templates still attached, on a flat cutting surface.

Align all of the lines on both panels.

Once aligned, put several pieces of painters tape between the two panels to hold them in alignment.

Use a weight, like a full 12 pack of beverage cans, to hold the wing down to the work surface while making cuts and alignment lines on the wing.

Finish cutting out both panels' outlines at the same time.

Align the metal ruler across both panels at the top of the paper template horizontal line. Use a single edge razor blade and the metal ruler to cut the line across **both** panels.

Repeat for the bottom horizontal line at the bottom of the paper template.

The holes near the red exes area, near the rear bottom of the wing, don't need to opened if the bomb drop is not going to be used.

The ovals for the aileron control horn clearance, in the red exes area, near the rear of the wing bottom, don't need to opened, as Flite Test's control horns are not used.

Cut 50% deep lines on the inside of the horizontal parallel lines, with the red exes between them, near the bottom of the wing panels.

The foam between the lines is removed for the "C" fold that folds back over itself near the back edge of the bottom of the wing.

Slide the attached wing panels to the edge of the building surface, "break" and then remove the foam board in the slot, on both panels, so that only the bottom paper remains. Some template paper will come off the rear now.

Move the panels back onto the building surface.

The holes in the spar area do not need to be opened if the bomb drop or aileron servos are not going to be used. (This is optional and not needed for the 3-channel version.)

If servos are to used in the wing, use an X-ACTO knife, with #11 blade, to cut out the three holes and remove the foam board from the holes.

On the green lines on the printed templates, use the Frearson screwdriver to make alignment lines on the foam board for the spar. (This is a different method than used on the fuselage.) Offset the metal ruler to get the point of the screwdriver on the line and very lightly crease the foam board so that the alignment lines can be seen on the foam board when the printed template paper is removed.

Use a 1/16" drill bit to hand drill the centers of Ken's CG circles. Optionally, FT's CG can also be drilled. (These small holes will be used later to "measure" the CG position.)

50% deep cut the horizontal red line in the double bevel area for the leading edge of the wing.

Cut only through the foam board top paper and the template paper along the two blue horizontal parallel lines of the double bevel area. Remove the printed paper and top of the foam's top paper. The foam should now be exposed between where the blue horizontal lines were.

Watch this part of the Flitetest video about creating the double bevel. Josh uses a knife, I prefer to use sandpaper on a sanding block.

FT video showing beveling of slot between the top and bottom wing panels.
https://youtu.be/Uw0_9Zmcewc?t=1426

Move the wing to the edge of the building surface so that the 50% deep cut line is just over the edge. Place weight on the foam board. "Break" the wing along the 50% cut line. Temporarily, lift the weight. Fold the unsupported part underneath the part on the building board. Return the weight. Sand the bevel between the "break" and removed paper using the exposed foam as a guide.

Remove the weight and turn the wing over and repeat the process for the other bevel.

Unfold and reposition the wing on the building board.

The double bevel angle test, for the wing's leading edge, as demonstrated in Josh's video, will be done later.

Cut out the two triangles on both sides of the wing's center section. Cut on the insides of the lines of the triangles. Remove the triangles. Use a toothpick as an aid to remove the triangles.

Use the Frearson screwdriver to make grooves in the top of the wing, along the red lines, for the top of the wing bending points. Offset the metal ruler to get the point of the screwdriver on the line. More pressure is required than when just to making alignment lines.

If ailerons are to be used, use the Frearson screwdriver and metal ruler to mark the green aileron lines. Do NOT cut out or bevel the ailerons yet!

Remove the tape and paper templates from the left and right wing panels. The panels will separate.

Carefully realign the panels and use painters tape to tape them back together.

Use a fine line marker and the metal ruler to make the wing spar alignment lines more visible.

If ailerons are to be used, use a fine line marker and the metal ruler to make the aileron lines more visible. Note on the foam board that the 50% deep cutline is the line closest to the wing's leading edge.

Spread Tacky Glue on the "back" part of the fold for the "C" fold. Spread the glue with a finger. Clean the finger with water and a rag. Make the "C" fold on each panel and pin them in place. The FT video showing the "C" fold.
https://youtu.be/Uw0_9Zmcewc?t=1374

Remove the painters tape used to hold the panels in alignment.

Very Important Note Before Starting the Next Step: If any cracking is heard during the bending of the top wing panel during the trial bend, the leading edge is tearing apart. STOP IMMEDIATELY and sand the angle more. If the leading edge has a tear in it, cover the tear on the outside of the wing with Scotch transparent tape and run a little tacky glue into the tear seam in the double bevel. Wipe most of the glue out of the V of the double bevel, leaving just a light coating at the tear.

Do the leading edge test as shown in the FliteTest video.
https://youtu.be/Uw0_9Zmcewc?list=TLPQMTMwMzIwMjDpSvSVEyiDtw&t=1507
Adjust if necessary.

Turn the wing panels over and follow the procedure demonstrated in the video for joining them with packaging tape.

This is the Flite Test video demonstrating joining the wing panels with packaging tape.
https://youtu.be/Uw0_9Zmcewc?list=TLPQMTMwMzIwMjDpSvSVEyiDtw&t=1518

Set the wing panels in a "V", as shown in the video, and run Tacky Glue through the joint.

Lay the wing flat on the building surface and wipe off any excess glue with a finger.

Use the spar alignment lines on the wing panels to Tacky Glue the spar in place.

Use a finger to spread the tacky glue on the bottom of the spar, align the spar and press down.

Place the wing panels on a flat surface, set soup cans on the spar until the glue dries.

Power Pod (cont.)

Important Note About the Plywood Parts

The following section contains the instructions on how to create the firewall and landing gear tab from 1/8" and 3/32" birch plywood for the firewall and landing gear tab for my version.

In the both the "Introduction, Techniques and Tools for Ken Myers' Modifications to the Flite Test Simple Cub" and "Tools and Supplies List and Notes" I note an alternate method for those who do not have the tools to cut the plywood parts or access to the birch plywood used for model airplanes. See the section "Firewall and landing gear tab note" in either of those documents.

1. Use a wood cutting saw to cut out the 1/8" plywood piece for the **firewall**.

Measure the firewall on the printed paper template and cut out 1/8" plywood to match the paper template's dimensions. (Both of the firewall templates have the same dimensions.)

Put the cross-mount on the motor so that the wires exiting the motor are down. Determine which firewall template to use.

Cut out the correct paper template for the firewall so that the wires exit the bottom of the firewall. Cut it ON the lines.

Use spray adhesive to affix the firewall template to the 1/8" plywood firewall.

Use a pin vice, with a 1/16” bit, to pre-drill the centers for the five holes in the firewall.

Use a 5/32” drill bit, in an electric drill, to drill the five holes of the x-mount template to accept 4-40 blind nuts.

Use a 3/8” drill bit, in an electric drill, to drill out the center hole of the firewall.

Place the x-mount from the Cobra 2213/26 motor on the firewall.

Run the 4-40 bolts through the mount and firewall and tighten four blind nuts into the plywood.

After seating the blind nuts, remove the 1/2” 4-40 bolts and x-mount and put them in the motor box.

Set the power pod on a flat surface.

Tacky Glue the firewall to the front of the power pod.

The bottom of the firewall aligns with the bottom of the power pod. Use painters tape to hold the firewall in position on the front of the power pod.

Use a scrap piece of foam board to cut a 3/16” wide, 3” long piece of foam board. Tacky glue and pin it to the top, right side of the power pod. The piece was colored blue for the photo.

Set the power pod aside and allow the glue to dry.

Landing Gear and Landing Gear Tab

1. **Note:** If the Flite Test foam board landing gear tab is to be used, the following notes about the construction of the landing gear tab out of plywood can be omitted. I cannot recommend the foam board landing gear tab, but it can be used if the plywood tab cannot be created.

Measure the printed template’s dimensions for the **landing gear tab**.

Use those dimensions to cut two 1/8” plywood outside landing gear tabs and the 3/32” plywood middle landing gear tab plywood.

Cut out the paper template for the firewall middle, 3/32”, plywood landing gear tab. Cut it ON the lines.

Use spray adhesive to affix the middle landing gear tab template to the 3/32” middle landing gear tab plywood.

Cut the middle 3/32” plywood into the two parts for the middle landing gear tab to allow for the 3/32” landing gear wire.

2. Bend the **wire landing gear**.

Use a workbench vice, a pair of slip joint pliers and your hands to bend the 3/32" piano/music wire into the shape shown on the landing gear wire template. Make sure the axles are as close in alignment as possible so the the plane doesn't sit on the ground with a "tilt" to the fuselage.

Hint: It is easier to use a piece of 3/32" landing gear wire longer than what is necessary for just the landing gear. A longer piece of wire allows more leverage for some fine hand adjustment.

Trial fit the wire by putting the three plywood pieces for the landing gear tab together and adjust as necessary.

Cut the "axle" parts of the landing gear to 2" for now.

Once the wire and plywood pieces all make a good fit, Tacky Glue the assembly together and tape the unit together with painters tape.

Set the landing gear tab, with the gear wire "trapped" inside, on a flat surface.

Place some extra 1/8" plywood under the axle bends to hold the wire in the correct position while the glue is drying.

Set aside to dry.

Wing Construction (cont.)

1. Remove the pins from the "C" fold at the rear of the wing.

Watch this part of the Flite Test build video to see what to do next.
https://youtu.be/Uw0_9Zmcewc?t=1676

Do the practice wing fold over as shown in the video.

With the wing top still folded over, use the point of a toothpick, in the triangles cut in the wing top near the center section, to mark the location of the spars. Once the wing is unfolded, use a single edge razor blade to cut V slots well into the spars, at the marked areas. The V slots in the spar allow the wing panels to rise easier when the dihedral is added.

On a flat surface, run Tacky Glue along all of the places the hot melt glue was shown in the video.

Fold the wing over, pressing down across both spar areas.

Use a lot of full cans of soup and/or vegetables to weight down the spar area and trailing edge. Because of the angle at the back of the wing, the cans at the trailing edge will only be partially be on the foam board.

Leave the wing on a flat surface for the glue to dry.

Preparing the Dowels and Craft Stick

1. Cut two 4" pieces and two 3" pieces of 3/16" **wooden dowel**. The 4" pieces are for the wing rubber band hold downs and the 3" pieces are for passing through the power pod to hold it in place.

Not all wooden dowel rods, labeled 3/16”, are actually 3/16” in diameter. With the same piece of 3/16” wooden dowel used for the wing hold downs, create a tool. Use a pencil sharpener to put a point on that piece of dowel. It will be used to create an actual 3/16” hole that matches the diameter of the wooden dowel being used.

Create the rear **rubber band wing protectors**.

Cut a craft stick into two 1-1/2” rectangular pieces. With the stick laying flat, to form a shallow V to bend the rectangle, cut about half way through the piece and bend/break that cut. Do not break the two sections apart. It just needs to bend and form an angle. Do the other piece. Set both pieces aside.

Set the tool, dowels and rubber band protectors aside.

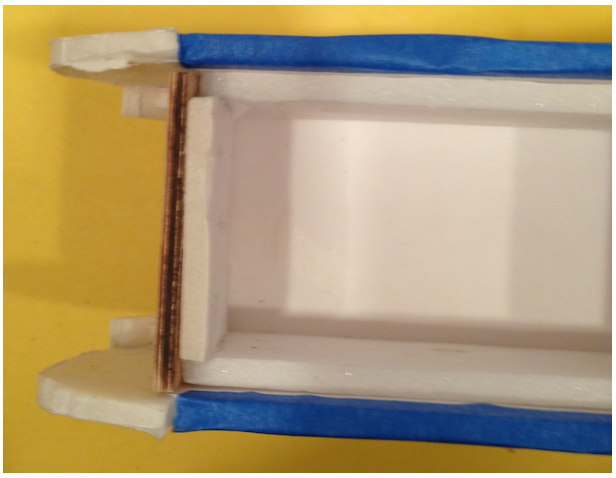
Fuselage Assembly

1. DO NOT REMOVE THE OUTSIDE TAPE AND CUTOUTS IN THE FUSELAGE YET.

Remove the painters tape and pins from the **INSIDE** of the fuselage and the tape and pins and tape from the power pod.

If necessary, sand the top of the battery protector level with the top of the firewall.

Use the landing gear tab assembly to trial fit the landing gear tab into each slot of the front fuselage doublers and adjust the width of the slot as necessary.



The rear of the firewall should align with the front of the **notch on the left fuselage side**. (The painters tape in the photograph is for clarity only. It is NOT the tape holding the power pod to the left hand side of the fuselage, as mentioned next.) With two pieces of painters tape, tape the power pod into position on the left hand fuselage side.

Add a few pins to also hold it into the correct position. Make sure the the two pieces of tape can be removed through the cabin top, once the large cutout in the cabin top is removed.

Fold the fuselage into shape

Temporarily pin the power pod into position on the right fuselage side, at a few convenient places.

Once satisfied with the fit of the firewall and the alignment of the fuselage sides, remove the pins from the right side of the power pod and unfold the fuselage.

Prebend the windshield, at the groove, by holding down the top of the fuselage to the building surface and lifting the bottom of the windshield up.

Do the same procedure to lightly prebend the rear of the fuselage sides in at the grooves just behind the cabin area.

Apply a bead of Tacky Glue to both sides of the cabin top area where it makes the “B” fold. For the “B” fold, the sides of the fuselage sit beside, not on top of, the fuselage top.

Fold the fuselage over, with the tops of the fuselage sides and the fuselage top all sitting on the building surface and pin both sides of the power pod, sitting on top of its doublers, to the fuselage sides.

Slide the landing gear tab in as far as it will go at this time. (Slots in the fuselage sides for the gear wire will be cut later.)

Put painters tape across the fuselage bottom just to the rear of the landing gear tab.

Pre-bend the front fuselage bottom piece.

Pre-bending the bottom piece for the fuselage is shown in the FT video here.
https://youtu.be/Uw0_9Zmcewc?t=2862

Lightly prebend the front fuselage bottom piece.

Trial fit the front bottom piece.

Apply Tacky Glue to the sides of that piece, but not the rear.

Butt the rear of the front bottom piece to the landing gear tab and pin the front bottom piece into place.

Put a piece of painters tape across the top of the fuselage where the cutout for the hatch is to hold the sides together.

Apply Tacky Glue to the sides of the windshield and pin it into place.

Use a scrap piece of foam board to lift the rear top piece of the fuselage so that Tacky Glue can be applied to the fuselage sides. Remove the foam board scrap piece and pin the top rear to the fuselage sides.

Lightly prebend the bottom rear fuselage piece.

The pre-bending for this piece is shown in the FT video here.
https://youtu.be/Uw0_9Zmcewc?t=2532

Remove the painters tape from behind the landing gear tab.

Apply Tacky Glue to the side edges of the rear fuselage piece. Do NOT put any glue on the front of this piece where it butts up to the landing gear tab.

Butt the rear, bottom piece to the landing gear tab and pin the rear bottom piece into place along the fuselage sides.

To keep the landing gear tab from being glued in now, remove the landing gear tab with the landing gear wire and set it aside.

Use a 1/16” bit and hand drill the front power pod holes through the power pod. By hand, run a 1/8” drill bit through those holes. Next, run the specially made 3/16” pointed dowel tool through that holes. Insert one of the 3” through the holes. Do Not glue in the dowels.

To be able to view the holes for the rear dowel going through the power pod and the wing hold down dowels, remove the cutout from the top of the cabin area. Set the large cutout, from the top of the cabin area, near the wing. Later, it will be used in the final wing construction.

Follow the same procedure for the rear dowel holes for the power pod.

Use the same procedure to insert the front and rear, 4”, wing hold down dowels through the holes leaving about one inch or so on each side of the fuselage. Do Not glue in the dowels at this time.

Set the fuselage aside to dry.

Wing Construction (cont.)

1. Offset the metal ruler and use the Frearson screwdriver to continue the long, non-angled, lines of the triangles near the center section of both the leading and trailing edges creating a groove to allow the wing to bend easily there.

The FT build video demonstrates how to add dihedral.
https://youtu.be/Uw0_9Zmcewc?t=1876

Bend the dihedral, as shown in the video. It is better to make the bend more than just what will fit the dihedral angle so that the panels will not “settle” after the wood or foam board gauges are removed.

I prefer to use pieces of what “they” call 2x2 lumber for the 3-channel version and what “they” call 1x2 lumber for the 4-channel wing instead of the dihedral gauges.

The wood is placed parallel to the center section, as shown in the photo.

Slide a piece of 2x2 for the 3-channel wing, or 1x2 for the 4-channel wing, under each wing panel until they reach the bottom of the wing where it stops before the tips, approximately 4-3/4” from the wing tip.

Mix up some epoxy. Use a toothpick to apply the epoxy glue to the insides of the triangles and along the joints of the wing center section and the panels.

Lay wax paper over the joints and weight the center section with soup cans.

Allow the epoxy to cure.

Important Note: At this point the glue may be drying on the fuselage and the epoxy curing on the wing.

It is a good time to clean the building area, watch TV, catch up on Honey dos, or whatever.

If Optional Ailerons are to be used

1a. Once the epoxy has cured, set the wing on the building board with the top of one wing panel on the surface of the building board. Align the trailing edge of **one** of the panels to the edge of the building surface.

Tape the trailing edge down to the edge of the building surface so that the aileron is lying flat.

Use a single edge razor blade to make a 50% deep cut in the previously drawn line closest to the leading edge of the wing.

Cut only deep enough in the line closest to the trailing edge so that the top paper can be removed.
Cut the aileron line from the wing's trailing edge by cutting through only the line that parallels the center section. DO NOT CUT THE WHOLE AILERON FREE FROM THE WING.

Remove the top paper strip from between the two cut horizontal parallel lines.

Undo the tape from the trailing edge.

“Break” and fold the aileron over the top of the wing.

Painters tape the aileron to the top of the wing.

Set the wing, with the aileron taped on top, on the edge of the building surface and sand a 45-deg bevel using the exposed foam as a guide.

Cut a 16” length of filament tape and make the tape hinge between the bottom of the wing and bottom of the aileron.

Remove the painters tape from the top of the wing and aileron.

Be sure the aileron moves freely at the cut between the aileron and center section. Sand to adjust as needed.

Cut another 16” piece of filament tape and create the top of the hinge between the wing panel and the aileron.

Do the aileron for the other wing panel in the same manner.

Do NOT start the next steps until the glue has dried on the fuselage.

1. Remove all of the pins and tape from the outside of the fuselage. If the plane is to be painted, leave the tape holding the power pod to the fuselage side, but remove any pins in the battery compartment area. If the plane is not going to be painted, the painters tape and pins can also be removed on the inside of the fuselage.

Use a sanding block to sand off any paper overhang between the fuselage sides, top and bottoms.

If any of the top paper lifts, Tacky Glue it back down.

Remove the painters tape holding the cutouts in the fuselage sides, top and bottom, and remove the cutouts. A #11 blade will help in areas where the form board didn't quite get cut all the way through.

Set the large cutout, from over the cabin area, aside with the wing. It is used on the wing later.

Apply a bead of Tacky Glue to the exposed foam board at the front and top front of the fuselage, where the hatch is. This is the same process as was used on the horizontal stabilizer/elevator and vertical stabilizer/rudder assemblies.

Slide the landing gear tab into its slot and mark the width of the wire on the bottom side of the fuselage. Remove the landing gear tab. With an X-ACTO knife and #11 blade cut slots the width of the gear wire 1/2" towards the top of the fuselage. Reinsert the landing gear tab and reinsert. Make any corrections to the slot as needed to get the bottom of the landing gear tab bottom level with the bottom of the fuselage. When satisfied with the fit, remove the landing gear tab with the landing gear and set it aside.

Test fit, but do NOT glue, the horizontal stabilizer/elevator and vertical stabilizer/rudder. Pinch the small tab on the front of the rudder hinge so that it slides easily into the rear of the fuselage.

Remove the units from the tail and set them aside with the fuselage.

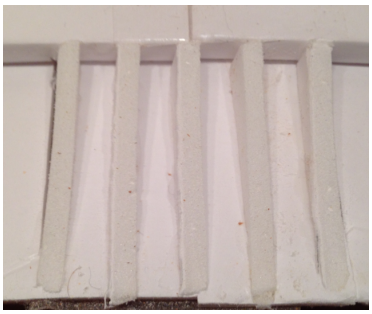
Wing Construction (cont.)

1. Run two strips of packing tape over the top of the wing between the center section and the wing panels. The tape will overlap.

This part of the FT build video shows the packing tape added to the top of the wing at the dihedral joints between the center section and the wing panels.
https://youtu.be/Uw0_9Zmcewc?t=1981

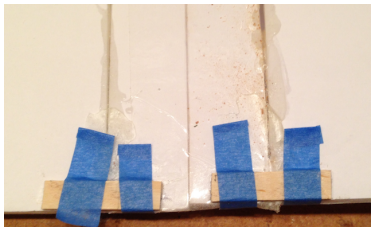
Do not run the packing tape around the trailing edge very far, as the the center section trailing edge reinforcements are glued to the bottom of the wing in that location.

If servos are to be used in the wing, cut the packing tape out of the hole in the wing center section bottom.



Tacky Glue the five triangular reinforcements to the rear of the center section and pin them into position, as shown in the photo.

The photo shows the 5 rear triangular reinforcements for the center section. The pins were removed and the triangles sanded flat to the bottom of the wing.



Turn the wing over and put pin pricks in the tape trailing edge of the center section where the rear rubber band protectors will be glued on. Use Tacky Glue to glue on the rear rubber band protectors and painters tape to hold them in place until the glue

dries.

On the bottom of the wing, put a mark on the center line of the center section 3/4” from the leading edge of the wing.

Use a metal ruler and fine line marker to extend the center line of the center section all the way to the end of the center triangle, as shown in the photo.

Align the cutout from the fuselage cabin top to the wing center line. Use the line on the center line of the cabin top cutout to align it to the wing’s center section. Pin, DO NOT glue, the cabin cutout in place on the wing’s center section.

Trial fit the wing onto the fuselage.

Use the 90-deg triangle to align the trailing edge to the wing perpendicular to the fuselage. Adjust the cutout as necessary.

When satisfied with the alignment, remove the top cabin cutout from the wing. Pin prick the tape on the wing, where the cabin top will be glued onto the wing. Use Tacky Glue to glue the cabin top to the wing and a few straight pins to hold it in place until the glue dries.

If ailerons have been cut into the wing, use painters tape to hold them into the wing’s original trailing edge position.

Use a couple of #33 rubber bands to hold the wing in place on the fuselage.

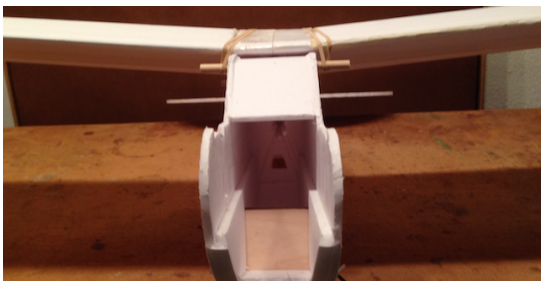
Fuselage Construction (cont.)

1. Put a piece of painters tape across the horizontal stabilizer and elevator to hold the unit flat.

Slide the horizontal/elevator piece into position.

Slip the horizontal stabilizer/elevator into its slot in the fuselage.

Use line of sight to set the horizontal stabilizer/elevator to the alignment of the wing dihedral.



Once satisfied that the stabilizer can be set to the correct angle in the cutout, remove it from the cutouts.

Put Tacky Glue on the top and bottom of the fuselage cutouts for the horizontal stabilizer. Slide the horizontal stabilizer back into position.

Realign the stabilizer.

Once satisfied with the alignment, DO NOT touch the whole assembly until the glue has dried.

Pause here for the horizontal stabilizer glue to dry.

2. Once the horizontal stabilizer is dry, run a bead of Tacky Glue along the top of stabilizer at the joint between the horizontal stabilizer and fuselage.

Trial fit the hatch. The hatch is intentionally a bit to wide. Trim the hatch, on the fuselage's left side, to fit. Filament tape will cover the cut edge.

Hinge the left side of the hatch to the left fuselage with filament tape.

Position the fuselage with the bottom facing up. Run a bead of tacky glue along the bottom of stabilizer at the joint between the horizontal stabilizer and fuselage.

Reinsert the landing gear tab completely.

If the wire landing gear axles are not parallel to the horizontal stabilizer, "tweak" the landing gear wire with a vice or pliers until they are.

Once satisfied that the landing gear is bent to match the horizontal stabilizer, use Tacky Glue to glue the landing gear tab in place and painters tape to hold the landing gear in the fuselage.

Vertical Stabilizer/Rudder (cont.)

1. Pinch the small tab on the bottom of the rudder. The tab fits into the slot in the fuselage. Pinching it allows the tab to slide easily into the slot.

Put a piece of painters tape across the rudder and vertical stabilizer to hold them in alignment.

Put Tacky Glue in the slot at the rear of the fuselage and along the sides of the rudder tab slots in the top of the fuselage.

Insert the vertical stabilizer/rudder.

Align the vertical stabilizer/rudder to 90 degrees by sight and with the aid of a 90-deg triangle.

Pin the vertical stabilizer/rudder and set it aside to dry with the rear of the fuselage on a roll of tape or the sanding block. This will keep the rudder up off of the building surface while the glue is drying.

Optional Windows and Optional Lightning Bolts

1. Use scissors to cut out the printed paper templates for both lightning bolts, the front windshield and the two areas where the side windows are. Leave about 1/4" around the outside of the part's template.

Use spray adhesive to affix the templates, one at a time, **to the back** of a black, or other dark color, Monokote trim sheet or contact paper. Arrange the lightning bolts, if used, first and then arrange the windows templates for best usage of the material.

Cut out the two lightning bolts, the windshield and the set of three side windows. Each of the three side windows can be cut apart with scissors after the whole unit is cut out of the graphics material.

Note: If contact paper is used, it might try to roll up on itself. Use painters tape to tape it to the cutting surface.

Set the graphics aside.

Landing Gear (cont.)

1. Be sure the landing gear wire was “tweaked” as previously noted.

Use light spackling to the fill the holes in the fuselage sides above and below the landing gear wire. (Optional)

Vertical Stabilizer/Rudder (cont.)

1. Once the glue has dried, remove any pins holding the vertical stabilizer in alignment.

Run a bead of Tacky Glue on the joints between the vertical stabilizer and both sides of fuselage top.

Landing Gear Fairings (optional)

1. If the optional landing gear fairings are going to be used, glue them on at this time.

Painting (optional)

1. Once the spackling and glue has dried, the optional painting can begin.

Warning: If too much spray paint is applied at one time, the Readi-Board will lift and bubble. Use very, very light coats.

While painting is optional, the orangish-yellow color that I chose shows up well in the sky. The paint also gives a bit of protection to the top paper layer of the foam board.

DO NOT ATTEMPT to get a “show room finish” with the paint. Too much paint only adds weight and the possibility of bubbling the paper on top of the foam. Use only enough spray paint to give the surfaces some color.

Remove the wing hold down dowels and the power pod dowels and set them aside.

Remove any painters tape from the horizontal stabilizer/elevator and vertical stabilizer/rudder pieces.

Use Patch-N-Paint LIGHTWEIGHT SPACKLING to fill any major holes that may have appeared during construction.

After the spackling has dried, sand the spackling.

Protect the landing gear wire from paint by wrapping it with newsprint and painters tape.

Spray on a very light coat of color. Wait awhile and spray on another very light coat. I was able to get enough covering using just two coats.

After the paint has dried throughly, reinsert all the wooden dowels and remove the painters tape and any pins holding the power pod to the inside of the fuselage side.

Graphics (optional)

1. After the paint has dried, affix the optional window and/or lightning bolt graphics.

Remove the front and rear wing hold down dowels and the rear power pod dowel.

Apply the windshield graphic.

Do not remove the backing on the on the front side window graphic. Align the front side window into the position that “looks” correct and put a small fine line marking pen mark at the top of the window.

Align a 12” ruler parallel to the top of the fuselage and just under the mark.



Place another mark near the rear of the cabin.

Put a piece of painters between the marks to use as an alignment line for the side windows.

Apply the three side windows. Align their tops to the tape and visually separate them.

Remove the painters tape.

Repeat for the other side.

Use a #11 blade to open the front hold down dowel holes and the rear power pod holes.

Reinstall all three dowels.

Use the bottom of the side windows as a visual alignment line and parallel the top of the lightning bolt about 3/8” below the bottom of the side windows.

Visually align the top point on the lighting bolt with the front of the windshield.

Remove only about the front 1/2 of the graphic’s protective backing from the front of the lighting bolt graphic.

Apply the lighting bolt, removing the rest of the backing as required.

Repeat for the other side.

Installing the Radio System

Items needed: Servos: two for the 3-ch or four for the 4-ch, one pkg. Dubro EZ connectors or two for 4-ch, NYLON KWIK-LINK (AKA clevis) ON 12", 2-56 ROD (5/PKG), slip joint pliers, white towel, #000 small “Phillips” type screwdriver, device for cutting pushrod wire, 1/16” drill bit, epoxy, tan masking tape, possibly a short servo extension, small plastic container or bag, fine line marker, 3/4” wide VELCRO Brand Sticky Back with Adhesive (or similar), 3/4” wide Velcro with NO Sticky Back (many times used for sewing), filament tape, straight pins, radio transmitter and receiver, DuBro Nylon Control Horn Set (Large), Dubro Heavy-Duty E/Z Connector 2-56 (6), brushless motor, ESC, 3S 1300mAh LiPo, propeller

Installing the two servos for the elevator and rudder control.

Trial fit the servos into the cutouts in the back of the fuselage.

Make sure that elevator servo wire lead, with the connector on it, can reach the receiver placed on the left fuselage side in the cabin area and be plugged into its slot in the receiver. The receiver is mounted on the left side of the fuselage between the power pod and cabin top of the cabin area. If the servo wire lead can’t reach the receiver, a servo extension is necessary.

Hint: The end of one of the rods with a Nylon Kwik Link/clevis can be turned into a tool with a hook on the end to “fish out” the servo wires.

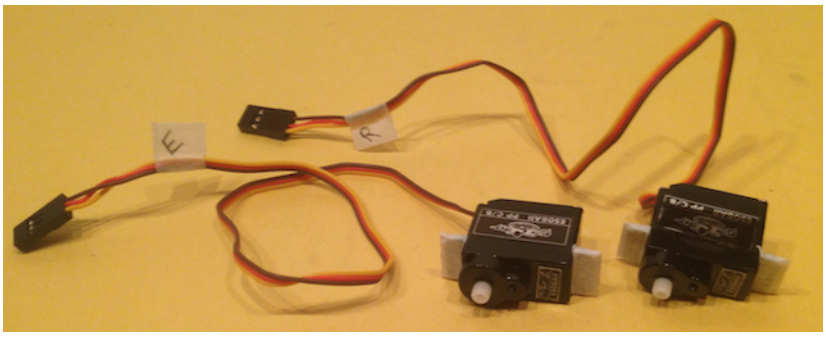
Personal Note: The length of the elevator servo wire was “just” enough using the FT servos supplied in the power pack B kit.

Sometimes servos come with a servo arm attached and sometimes not. If any servo arms are screwed onto the servos, remove the arms and screws and put them in a safe place like a small sandwich or snack bag or small plastic container.

Hint: Servo arm screws are very tiny and many servos do not come with extra servo arm screws. Spread a white towel on the area where servo arm screws are to be worked with. The towel prevents a dropped screw from bouncing and it should be easy to spot on the white, or very light colored, towel.

Use sandpaper and #11 blade to remove the sheen on the bottoms of the tabs of two servos.

Cut a 1.5” long piece of tan masking tape into two lengthwise pieces, and wrap each servo tab.



Trim the wrapped tape back to the tabs.

Cut about a 3/4” length of masking tape into two, lengthwise pieces, and wrap the tape to create “flags” near the connector end of the servo wire, as seen in the photo.

With a fine line marking pen, mark one servo “flag” E, for elevator, and the other one R, for rudder.

Mix up some epoxy with a toothpick. Feed the servo connector wire, with the E “flag” on it, through the servo hole in the left side of the fuselage. Turn the servo so that epoxy can be applied, with a toothpick, to the bottom of the servo tab with the E on the flag and insert into the left side of the fuselage. Repeat for the servo marked R on the right side of the fuselage.

Put a little epoxy around the outside of the servo tabs as well.

Set the fuselage aside.

Putting Pull Tabs on the Battery/Batteries

The wires on a battery should never be pulled.

Start a piece of filament tape at the connector end of the battery and run it lengthwise approximately 1.5” past the end of the battery.

Double the tape back over itself and then across the other side of the battery to the connector end of the battery.

The battery now has a pull tab on it.

DO NOT put any sticky back Velcro on the battery yet.

Repeat for any other batteries.

Adding the Velcro Strap to the Battery Compartment

Remove the power pod from the fuselage.

Overlap, and press together, two pieces of **non-sticky backed Velcro** about 1”.

Wrap the joint between the pieces with **filament tape**.

Insert the joined pieces of Velcro through the strap holes in the power pod.

Apply Tacky Glue to the center joint of the Velcro, which is glued onto the bottom of the power pod.

Pull the Velcro tightly against the bottom of the power pod

Pin the Velcro in place on the bottom of the power pod. DO NOT allow the pins to go through the bottom of the power pod.

Lay a power battery in place on the top of the bottom of the power pod and then trim the Velcro, with scissors, to fit the battery snugly.

To keep the Velcro strap pulled tightly to the bottom of the power pod, replace the battery with something that will fit in its place and return the battery to its “safe” container. (I used an empty servo box to replace the battery with in the power pod.)

Preparing the Servo Arms

Use a 1/16” drill bit to open up the hole in a servo arm that is closest to the servo screw hole.

Insert the EZ connector pin through the now 1/16” hole.

Use slip joint pliers to press the black snap washer into place on the bottom of the EZ connector.

Screw in the screw in the top of the EZ connector to keep from misplacing it.

Repeat for the second servo arm.

Align the servo arm on the left fuselage side for the elevator so that the EZ connector is on the arm facing down. DO NOT put the servo arm screw into the servo yet.

Align the servo arm on the right fuselage side for the rudder so that the EZ connector is on the arm facing up. DO NOT put the servo arm screw back into the servo yet.

Open a DuBro Nylon Control Horn Set (Large) package. Use a single edge razor blade to remove the control horn parts from each other.

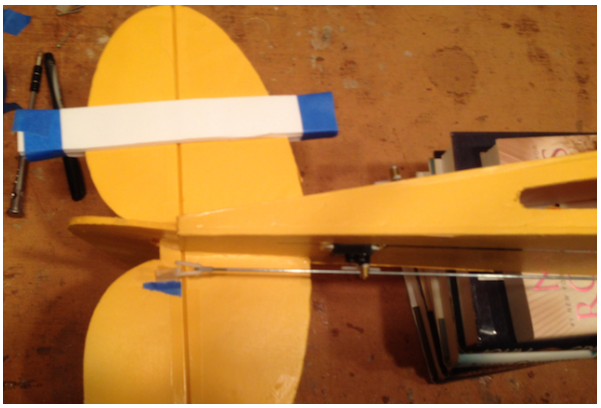
Place one of the two screws, packaged with the control horns, in one of the control horn holes, push it through the hole and then start to screw that screw into one of the holes in the flat bottom screw plate. Only screw that screw a few turns into the flat screw plate. Put the other screw into the other hole of the control horn and screw it into the other hole of the flat screw plate.

Screw both screws into the flat screw plate about 1/2 the length of the screws. (This procedure adds threads to the screw holes in the flat screw plate and makes assembly much, much easier when they are installed on a movable surface.)

Repeat for the other control horn assembly.

Remove the screws from the control horn assemblies and set them aside in a safe place.

Cut two pieces of scrap foam board about 8” long and an inch wide.



Put one of the cut pieces of foam board across the top of the left horizontal stabilizer and elevator unit and one of the cut pieces under it. Wrap the ends of the pieces with painters tape. This device holds the horizontal stabilizer and elevator level to each other.

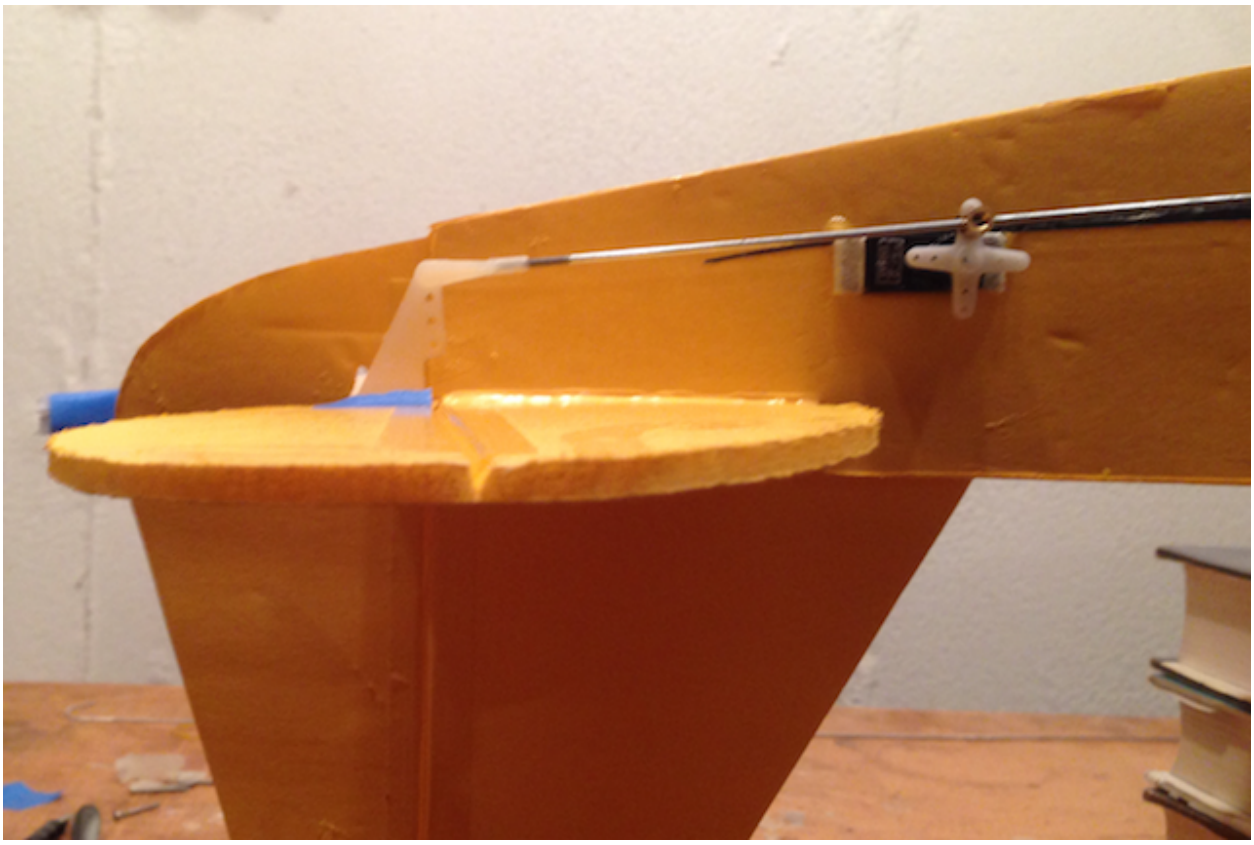
Remove one Dubro Rod w/Nylon Kwik Link/ Clevis 12” from the package.

Remove the screw from the EZ connector and set the screw in a safe place. (I put it under a piece of painters tape on the work surface.)

Put the pin of the Kwik Link/Clevis through the bottom hole of one of the control horns. DO NOT close the Kwik Link/Clevis.

Insert the rod, with the Kwik Link/Clevis on it, through the hole in the EZ link on the servo arm for the elevator servo, which is mounted on the left fuselage side with the servo arm with the EZ connector on it on the down, or bottom, side of the servo.

Turn the plane over and set it on some books, or other objects, so that it the plane can be worked on upside down.



Align the pushrod from the servo to the control horn as shown in the photo.

Align the holes in the control horn for the Nylon Kwik Link/Clevis so that they are vertically over the center of the hinge line. (Painters tape was used in the photo to hold the control horn in place for the photo.)

Once the control horn is aligned, put pin pricks in the two holes in the control horn. The pins should go all the way through any tape and the foam board.

Mark the pushrod about 1/2" past the EZ connector towards the front of the fuselage. Later, it is cut off at that mark.

Remove the control horn and pushrod with the Nylon Kwik Link/Clevis.

By hand, run a 3/32" drill bit through the holes made by the pins.

Screw the control horn onto the elevator. The flat plate of the control horn should be snug against the top of the elevator. The screws stick up quite a bit above the plate. They can be cut off or just left there.

Cut the pushrod to length.

Run the pushrod through the EZ connector and put the pin of the Nylon Kwik Link/Clevis back through the control horn. DO NOT close the Nylon Kwik Link/Clevis yet or put the servo arm screw in yet.

Put the screw back into the EZ Link Connector, but DO NOT totally tighten it now.

Slide the two foam board pieces, that are taped together, off from the horizontal stabilizer/elevator assembly and move that unit to the vertical stabilizer/rudder assembly to hold them in alignment.

Repeat the process for the rudder servo connection to the rudder except that the servo arm, with the EZ Link Connector on it goes towards the top of the fuselage, or up.

Once the rudder is hooked up to the servo, remove the surface alignment tool and set it aside for now.

Use a needle nose pliers to add a "hook" to the end of one of the pushrod wires, which is connected to the Nylon Kwik Link/clevis. Use the "hook" to grab and pull the servo wires into the cabin area.

Put the elevator servo connector, with the "E" flag on it, into the receiver slot for the elevator. The receiver instructions note the function designations for each receiver connector slot.

If building the 3-ch version **plug the rudder connector**, with the "R" flag on it, **into the aileron connector slot of the receiver**. With the rudder servo plugged into the aileron connector slot of the receiver, the right stick of the transmitter then controls the "turning" and the "up and down".

If building the 4-ch version plug the rudder servo connector, with the "R" flag on it, into the rudder servo connector slot of the receiver.

A Word About Velcro or Hook-and-Loop Fastener With Adhesive Backing

Sticky-back Velcro is used to hold the receiver to the left fuselage side at the rear of the cabin area. It is also used to keep the power battery from sliding fore and aft.

There is a protective plastic tape covering the adhesive on the back of the Velcro. One piece of Velcro is what I describe as “fuzzy” and the other piece I describe as “prickly”.

To keep parts that are secured with Velcro interchangeable, stick the “fuzzy” side to the airframe and put the “prickly” side on the part being attached to the airframe.

Cut about a 1/2” of the Velcro “fuzzy” and “prickly” tape to put on the receiver.

Put the Velcro together, “fuzzy” side to “sticky” side, and then remove the protective tape from the “prickly” side, but DO NOT remove the protective tape from the “fuzzy” side.

Stick the Velcro to the back of the receiver and just let the receiver lay loose in the fuselage for now.

Finishing up the Power Pod

Get the **power pod** and and put it on the work area. Trial fit the power connector on the ESC into the slot for it in the bottom of the power pod. If it doesn’t fit through the slot, use a #11 blade to “trim” the slot.

Use the 4-40 bolts to attach the motor. The motor should be oriented so that the motor wires exit the motor toward the bottom, if possible. If the motor wires go to the side, that’s okay too.

Hook up the three bullet connectors between the ESC and the motor.

Note: When hooking up the three bullet connectors between the ESC and the brushless motor, there is typically no correct order. Usually, even if the wires between the ESC and motor are the same brand and color coded, that doesn’t mean that the motor will turn in the correct direction. To add even more to the confusion, sometimes the wires on either the ESC or motor are all the same color! To change the motor’s rotation swap any two of the bullet connectors. Checking the prop rotation is the next step.

EXTREMELY IMPORTANT NOTE!!!!

What you are about to do can be extremely dangerous!

Remove any pins from the bottom of the power pod.

Insert the power pod into the fuselage and secure it with one of its dowels. (The power pod is going to be removed shortly, so one dowel is enough for now.)

The receiver and ESC are NOT installed in the airframe at this time. They remain loose on the work surface.

Plug the radio lead from the ESC into the throttle channel of the receiver.

Securely attach the prop you intend to fly with to the motor.

Get the power battery from its safe place.

Get the transmitter that has been bound to the receiver.

Point the front of the fuselage away from you.

Turn on the transmitter and then plug the power battery into the ESC connector for it.

Hold the fuselage firmly. Be sure there are NO wires in the prop arc.

Once the ESC is armed, quick blip the throttle just enough to notice whether the air from the prop is blowing on you. If the air blows on you, the prop is turning correctly.

If the rotation needs to be changed, unplug the power battery from the ESC and swap any two of the three ESC wires to motor leads.

Retest as described above. The air from the prop will now be blowing on you. (Once the correct rotation of the prop has been determined do NOT unplug the wires between the ESC and motor again.)

Unplug the power battery and return it to its “safe” place.

Unplug the ESC lead from the receiver and set the receiver aside.

Remove the power pod from the fuselage. (If doing the 3-ch version, skip the next section and go to “**Checking the Center of Gravity (CG)**”.)

Adding Aileron Servos

If the aileron version of the wing was built, follow these steps to set up the ailerons. If the 3-ch wing is being used, move to the instructions for **Checking the Center of Gravity (CG)**.

Trial fit the servos in the wing and pull the servo leads out of the center hole of the wing. Needle nose pliers are handy for grabbing the connectors and pulling them through the center hole.

When satisfied with the fit of the servos, mix up some epoxy with a toothpick.

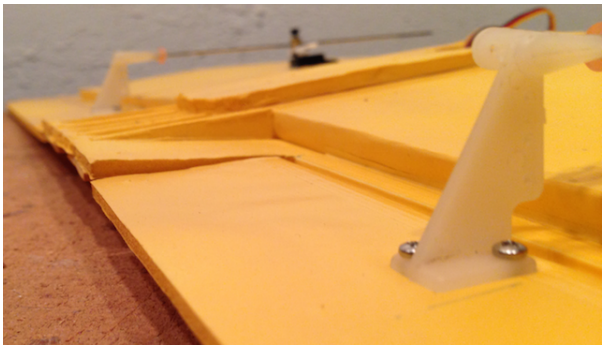
Pull the wing servos out of their slots just enough to put epoxy on the bottoms of the servo tabs with a toothpick. (I oriented the end of the servo with the spline attachment for the servo arm toward the ailerons.)

After insertion into the aileron cut out hole, put some epoxy around the top of the taped servo tab.

Put the EZ connectors on the servo arms in the hole closest to the servo screw. Use the same procedure as for the rudder and elevator servos.

Secure the control horns using the same procedure as on the rudder and elevator. The servo arms, with the EZ connectors on them go toward the wing tips on both panel, as seen in the photo. Note that the arms being used are on opposite sides of the servos from each other.

Once the control horns are secured onto the ailerons, insert the pin of the Nylon Kwik Link/ clevis into the control horn.



Hold the aileron so that the bottom of the aileron is at the top of the wing panel that is attached to the center section.

Tighten the EZ connector screw just enough to hold that position.

Mark the pushrod about 1/2” past the EZ connector.

Remove the push rod from the EZ connector and the control horn and cut the control rod at the mark.

Reinstall the pushrod and close the Nylon Kwik Link/clevis.

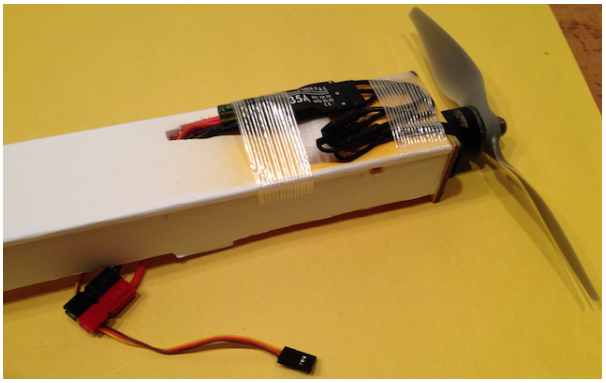
DO NOT tighten the screw fully on the EZ connector yet.

Do the same for the other servo.

Set the wing aside.

Checking the Center of Gravity (CG)

Remove the power pod and put it on the bench.



Put the ESC's power connector and servo connector through the slot for them in the bottom of the power pod.

Fold and tape the wires that are between ESC and motor to the bottom of the power pod.

Use filament tape to hold the ESC in place at this time.

Slide the power pod into the fuselage and insert both of the power pod 3/16" dowel rods.

Remove the protective tape on the Velcro on the receiver and press it into position on the left fuselage side between the top of the power pod and the top of the fuselage near the rear of the cabin area.

Cut a 3/8" piece of "fuzzy" and "prickly" Velcro and put them together.

Remove the plastic protector backing from one of the pieces and press it into the slot for the hatch hold down on the right side of the fuselage. Remove the plastic protector backing from the other piece and press the hatch down on top of it. Be sure that one piece of Velcro is stuck to the hatch and the other is attached in the slot. Separate the pieces of Velcro by sliding a small flat end screwdriver between them and wiggling to loosen the Velcro bond.

Cut between the Velcro in the fuselage slot and the power pod with a single edge razor blade.

Slide one 3/32" Dura-Collar/wheel collar onto each axle until it reaches the bend in the landing gear and tighten them into place. They are not coming off again.

Slide the DU-BRO 2.5" Micro Sport Wheels onto each axle. If the wheel does not turn freely, heat a piece of the same size wire as the landing gear with a lighter of some type and press that wire through the hole in the wheel. It might take a couple of times to get the wheel to turn freely on the landing gear wire.

Side a 3/32" Dura-Collar/wheel collar onto each axle to near the wheel. Tighten it only enough to not slip off the axle. (The outside wheel collars and wheels are removed shortly. The axles will be too long at this time. They are cut off later.)

Put the wing on the plane with six #33 rubber bands.

DO NOT HOOK THE BATTERY UP TO THE ESC! Lay the battery into its place with the wires going into the fuselage and then Velcro strap the battery in as far forward as possible.

Insert two pencil points into the CG holes on the under side of the wing and lift the pencils straight up.

If the CG is close, the nose will hanging slightly down.

(My CG came out almost perfectly using the recommended narrow 2.5" wheels when when either a 3S 1000mAh LiPo pack or 3S 1300mAh LiPo pack was place all the way forward in the battery compartment.)

If the plane is too nose down, the battery can be moved to the rear slightly in the battery compartment.

If the plane is not a bit nose down, with the pencils in my CG holes, weight, of some type, can be filament taped to the bottom, front of the power pod.

More Finish Work

Once the CG is satisfactory, and the position of the power battery known for my CG, remove the battery from the battery compartment.

Remove the rubber bands from the wing and set them and the wing aside.

Remove the prop, the two outside wheel collars and the wheels. (It is easier to work on the airframe with the wheels off.)

Slide the two wheel collars back onto the axles and loosely tighten them to keep them in an easily locatable place. Also screw the prop nut and any prop washer back on to prop adapter.

If ailerons are being used, insert a "Y" harness lead into the aileron slot connector of the receiver. (It may be necessary to remove the receiver and replace it to do this.). If the extremely long "Y" harness from the FT power pack is to be used, it can be doubled back on itself and taped to shorten it. (Remember, if no ailerons are being used, the rudder servo is already connected into the aileron connector slot of the receiver.)

The antenna on ALL 2.4GHz receivers is 30/31 millimeters long. If the antenna(s) appear(s) to be longer than that, the actual antenna is only the last 30/31 millimeters.

If the receiver has only one antenna, it can just be left pointing straight forward from the receiver.

If the receiver has two antennas, the antennas need to be placed at 90 degrees to each other.

(On mine I put and "S" bend in the top antenna wire and used tan masking tape to tape it parallel to the left fuselage side, near the top of the cabin area. To get the other antenna at 90 degrees to the first one, I put a 1/16" hole near the top of the middle side window and ran the actual antenna part straight out the side of the fuselage. It doesn't need to be outside, but that was an easy way to get 90 degrees between the two antennas.

If the 3-channel version is being completed, the wing does not need to be on now.

If ailerons are to be used, with the fuselage on the work surface, hook up the two aileron servo leads to the "Y" connector. Observe the proper polarity of the servo connectors, but it doesn't matter which lead goes into which connector on the "Y" connector.

When ailerons are to be used, put the wing on the plane and put two #33 rubber bands on to hold the wing in place. If a wing with ailerons is used, be sure that all the wires get tucked into the inside of the cabin area.

Remove the prop nut and any washers from the prop adapter.

Get a power battery.

Apply painters tape to the Velcro battery straps ends to hold them out of the way.

Turn on the transmitter and then plug in the power battery. Once the battery is plugged in, the best way to insert the battery can be chosen and the "bottom" of the battery becomes apparent.

Unplug the battery and turn off the transmitter.

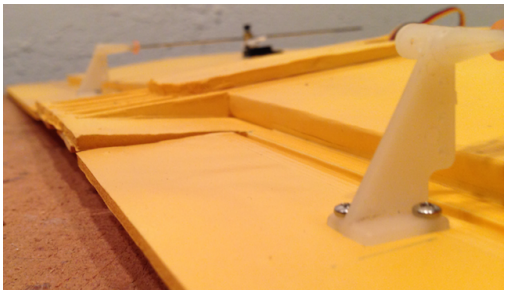
Cut a 3/4" "fuzzy" and "prickly" piece of Velcro. Put the "prickly" piece on the bottom of the battery about 1/2" from the front, where the wires are. Mate the "fuzzy" piece to it and remove the protective plastic.

Turn on the transmitter and then plug in the power battery.

Position the battery as it was during the CG check and then press down on the top, front of the battery to adhere the "fuzzy" piece of Velcro to the power pod.

Lift the LiPo with the filament tape pull tab and disconnect the power battery and shut down the transmitter.

Put Velcro on each LiPo: I have two 3S 1300mAh LiPo packs. That should have meant that the Velcro would be on the same side on both. It wasn't. It turned out that one slipped into place with the label name on top and the other slipped in better with the label name on the bottom. Try each individual battery to see which way works best or put the "prickly" side on both sides of the LiPo so that it will slide in either way.

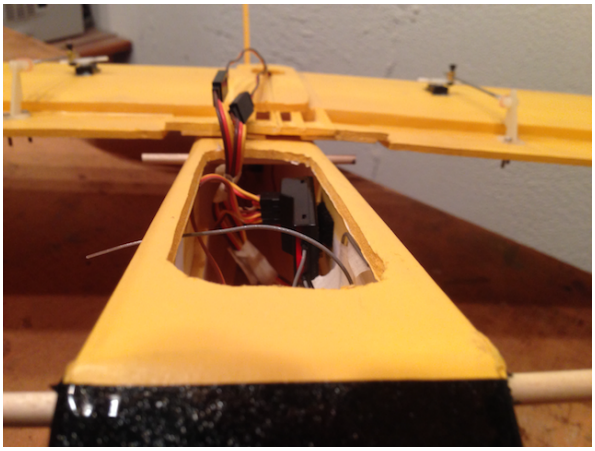


If the 3-ch wing is to be used, remove the wing and set it aside. Move on to **finishing up the installation of the rudder and elevator servos**.

If ailerons are to be used, remove the rubber bands from the wing and turn the wing over on the fuselage backwards.

Turn on the transmitter. Be sure the transmitter trims are in neutral. (The transmitter instructions explain about the surface trims, which are usually located near the control stick for the function that they control.)

Plug in the power battery. It DOES NOT need to be secured into the battery compartment as the prop is off the motor.



Hold the aileron in a position so that the bottom of the aileron is aligned with the top of the aileron cut in the wing, as shown in the photo.

Fully tighten the set screw in the EZ connector of the aileron servo.

Turn the fuselage so that the other aileron can be done in the same way.

From the rear, the aileron alignment looks like the photo.

Unplug the ailerons from the “Y” harness.

Set the fuselage aside.

Put a white, or light colored, towel down on the work surface and place the wing on it. The chances of dropping a servo arm screw, in the next step, onto the work surface are very high.

Screw in the tiny screws into both aileron servos. A Phillips #000 Screwdriver is required. (The screwdriver, provided in the FT power pack will NOT work.)

Set the wing aside.

Finishing up the Installation of the Rudder and Elevator Servos

Note: The servos provided in the FT power pack do not come with the servo arms attached or a servo screw screwed in. The arms and screws are in the servo accessory pack. The screwdriver, provided in the FT power pack will not screw in the tiny servo screws. A Phillips #000 Screwdriver is required.

Check to see that the screw in the EZ connector installed on the elevator servo arm is loose, allowing the pushrod to slide.

Slip the surface alignment “tool”, that you previously made, onto the right horizontal stabilizer/ elevator assembly

Leave the “white” towel on the work surface and set the fuselage on top of books or other items so that the elevator servo can be worked on.

Turn on the transmitter and then plug in and strap the power battery into the battery compartment.

Tighten the screw in the EZ connector screws, while the transmitter and receiver are on.

Remove the surface alignment tool and “eyeball” that the surfaces are aligned. (If, from your “eyeball” inspection, the surface need just a bit more adjustment, use the clevis to make that adjustment, NOT the EZ connector.)

Unplug the power battery and turn off the transmitter.

Install a servo arm screw into the elevator servo.

Close and secure the Nylon Kwik Link/clevis on the elevator control horn.

Repeat the process for the vertical stabilizer/rudder. Be sure to slip the surface alignment tool onto that assembly.

Getting it Airworthy

DO NOT HAVE THE PROP ON AT THIS TIME!

Glue in the wing dowels to the airframe. The rod should extend equally from both sides of the fuselage. DO NOT glue the power pod dowels in.

Remove the 3/32" outside wheel collars.

Reinstall the wheels and outside wheel collars.

Cut off the excess axle length and any screws that are sticking through the bottoms of the control plates.

Turn on the transmitter and install a power battery.

3-channel Procedure For Checking the Throw Direction and Surface Deflection Angle
(The 4-ch version of this follows this section.)

Check to see that when the right stick on the transmitter is moved to the right, the rudder moves right when viewed from the rear of the airplane. If it does not, follow the instructions in the transmitter manual for reversing the aileron channel. Reverse the aileron channel if necessary.

Check to see that when the right transmitter stick is pulled towards the bottom of the transmitter, the elevator goes up. If it does not, follow instructions in the transmitter manual for reversing the elevator channel. Reverse the elevator channel if necessary.

How to Check the Throw Angle on the Elevator and Rudder

With the prop off the plane, to check the rudder throw angle, hold the right stick all the way over on the transmitter and unplug the power battery. Let go of the transmitter stick. The rudder will remain at full right deflection.

Use the angle gauge, with 12 degrees and 16 degrees on it, to measure the angle. You should see that the rudder is somewhere between 12 and 16 degrees.

Plug the battery back in.

To check the elevator throw angle, pull the right stick all the way towards the bottom of the transmitter and unplug the power battery. Let go of the transmitter stick. The elevator will remain at full up deflection.

Use the angle gauge with 12 degrees and 16 degrees on it. You should see that the elevator is somewhere between 12 and 16 degrees.

Plug the battery back in to neutralize the elevator.

Remove the power pack battery and turn off the transmitter.

Return the battery to its safe container.

4-channel Procedure For Checking the Throw Direction and Surface Deflection Angle
Check to see that when the right stick on the transmitter is moved to the right, the right aileron moves up. If it does not, follow instructions in the transmitter manual for reversing the aileron channel. Reverse the aileron channel if necessary.

Check to see that when the left stick on the transmitter is moved to the right, the rudder moves right when viewed from the rear of the airplane. If it does not, follow instructions in the transmitter manual for reversing the aileron channel. Reverse the rudder channel if necessary.

Check to see that when the right transmitter stick is pulled towards the bottom of the transmitter, the elevator goes up. If it does not, follow instructions in the transmitter manual for reversing the elevator channel. Reverse the elevator channel if necessary.

How to Check the Throw Angle on the Elevator and Rudder

The ailerons cannot be checked with the angle gauge, so the wing can be off the plane at this time.

With the prop off the plane, to check the rudder throw, hold the left stick all the way over to the right on the transmitter and unplug the power battery. Let go of the transmitter stick. The rudder will remain at full right deflection.

Use the angle gauge, with 12 degrees and 16 degrees on it, to measure the angle. You should see that the rudder throw angle is somewhere between 12 and 16 degrees.

Plug the battery back in.

To check the angle of the elevator throw, pull the right stick all the way towards the bottom of the transmitter and unplug the power battery. Let go of the transmitter stick. The elevator will remain at full deflection.

Use the angle gauge with 12 degrees and 16 degrees on it. You should see that the elevator is somewhere between 12 and 16 degrees.

Plug the battery back in to neutralize the elevator.

Remove the power pack battery and turn off the transmitter.

Return the battery to its safe container.

Before Flying:

Set the radio system failsafe. How to do this is usually included in the receiver instructions.

Check that the failsafe is working as expected with the prop off the plane.

Install the flying propeller.

Perform a range check of the radio system following the directions provided with the transmitter. (The first range check should be done at home, to see if any problems exist. Correct any range problems.)

Charge the LiPo battery/batteries just before going flying. DO NOT charge the battery/batteries the night before planning to go flying. Plans have a way of changing and leaving LiPo batteries at full charge is one of the best ways to ruin them quickly.

Prototype Specifications:

Kens-Simple-Cub-v5/Construction/All component weights.xls			
Simple Cub v5 3-ch weights			
No radio & pwr sys	**grams**	**ounces**	Inc. graphics & rubber bands
Fuselage	146.15	5.2	
Wing	129.2	4.6	
Total:	275.4	9.7	
With radio & pwr sys	**grams**	**ounces**	
Fuselage	307	10.8	
Wing	130	4.6	
Total:	437	15.4	
	grams	**ounces**	
Battery:	114	4.0	
RTF Flying Weight:	**551**	**19.4**	
	sq.in.	**sq.ft.**	
Wing Area:	297	2.06	
Plan Form Wing Span:	38 3/8"		
Wing Loading:	9.4	ounces per/sq.ft.	
Wing Cube Loading:	6.56	High end of park flyer range	

Simple Cub v5 4-ch weights			
No radio & pwr sys	**grams**	**ounces**	Inc. graphics & rubber bands
Fuselage	147.5	5.2	
Wing	127.9	4.5	
Total:	275.4	9.7	
With radio & pwr sys	**grams**	**ounces**	
Fuselage	334	11.8	
Wing	155.6	5.5	
Total:	489.6	17.3	
	grams	**ounces**	
Battery:	114	4.0	
Flying Weight:	603.6	21.3	
	sq.in.	**sq.ft.**	
Wing Area:	297	2.06	
Plan Form Wing Span:	38 3/8"		
Wing Loading:	10.3	ounces per/sq.ft.	
Wing Cube Loading:	7.19	Low End Typical sport/trainer type	

The following are notes that I took on the first few flights of the version 5 prototypes. The information may, or may not, be interesting to you.

Version 5 3-channel and 4-channel Flight Tests

May 16, 2020
The first flight tests were performed on a partly cloudy day. The winds were between 7 mph and 10 mph. The ambient temperature was approximately 60 deg. F/15.6 deg. C.

3-channel Flight Tests
The maiden flight required quite a bit of right aileron trim, actually all of it.

Important: Remember that the rudder on the 3-channel version is connected to the aileron output of the transmitter so that the control is on the right control stick, along with the elevator.

Once trimmed with the transmitter, the maiden flight went well. After the plane was landed, the rudder was physically adjusted on the plane to give some right trim with the transmitter aileron trim set to zero (0).

After the second test flight, more right was added to the rudder on the plane, as well as some down elevator, as the plane wanted to climb too steeply on full power.

With all of the physical trim changes on the plane and the aileron and elevator trims on the transmitter set to 0, the third flight was easy, as the plane flew very well at both low and moderate speeds and like most flat bottom airfoil wings, it climb quite a bit on full power.

4-channel Flight Tests

The first thing that I noticed on the maiden of the 4-channel version was that it was not as stable as the 3-channel version, and required more flying skill to fly it “smoothly”. That is why can only recommend this version to experienced pilots.

It required only a little aileron and rudder right trim on the transmitter and not as much as the 3-channel. Loops and rolls were flown on this flight.

Consecutive loops, rolls, stall turns and a Cuban 8 or two were flown on the second flight. It did want to climb at the higher power used for much of this flight, so some down elevator was physically added to the elevator on the plane and the transmitter elevator trim was zeroed.

Once the trims were physically adjusted, the 3rd flight was excellent. The plane flies well at moderate speed and allows for all of the sport aerobatics that I do, including inverted flight. Because it flies like a “sport” plane, it is NOT a good beginner plane in this configuration.

Power Pod Changes - May 24, 2020
Because both planes had a tendency to “pull” to the left in vertical climbs with full power while doing stall turns, more right thrust was added to the power pod construction and a new power pod was made for each plane. The new power pods included the added right thrust.

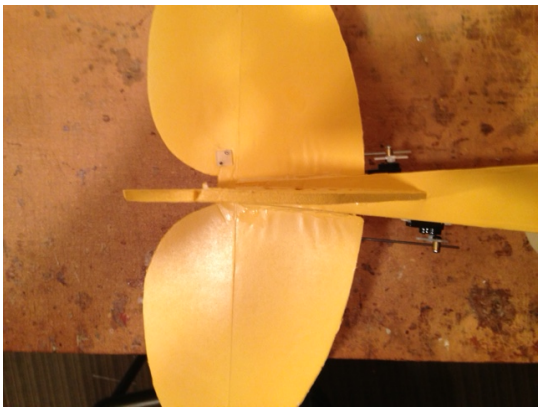
May 23, 2020
Test flights with the new power pods with more right thrust.
Temperature about 70 degrees F.

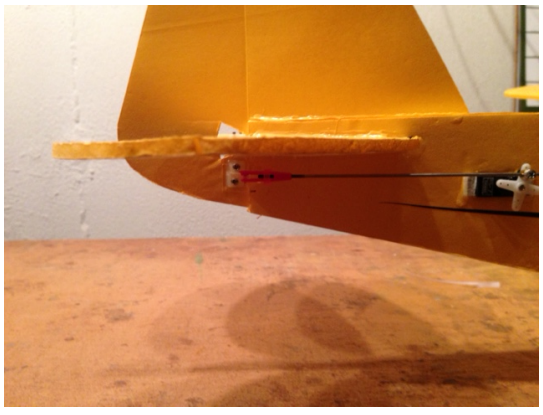
3-channel Flight 1:
Light wind. Tattu 3S 1300mAh installed in plane. Still needed a little right trim with the transmitter trims set to neutral/zero. Landed after 2 minutes and physically adjusted the rudder for a little right trim and reset the transmitter aileron/rudder trim to neutral/zero. Flew for another 4 minutes for a total of 6 minutes on the first battery run.

3-channel Flight 2:
No more trim changes were necessary. The wind had come up to about 7mph to 8mph and could easily be felt. The flight was 6 minutes and 7 seconds long.

The battery, which had been used for both flights was recharged at the flying field and the Revolectrix GT500 indicated that 709mAh was returned to the pack.
709mAh divided by 12 minutes is an average of 59mAh per minutes.
The usable mAh of a 1300mAh battery is 1300mAh times 0.8 (80%) yielding a usable 1040mAh capacity.
1040mAh divided by 60mAh per minute (rounded) = 17 minutes.
I’ve now set my timer to 8 minutes to do two 8 minute flights on the 3S 1300mAh pack.

With the transmitter trims for the ailerons, rudder and elevator in neutral/zero, the physical trim for the 3-channel version for the rudder and elevator is shown in the photos.





4-channel Flight 1:
The first flight was flown right after the first 3-channel test flight. The wind had pick up slightly. The 7 minute aerobatic type flight went well. No trim changes were need on the transmitter or plane during this flight.

The “other” Tattu 3S 1300mAh pack was used for this seven minute flight. It was recharged at the flying field and 662mAh was returned to the pack by the charger. That is 94.5mAh per minute.

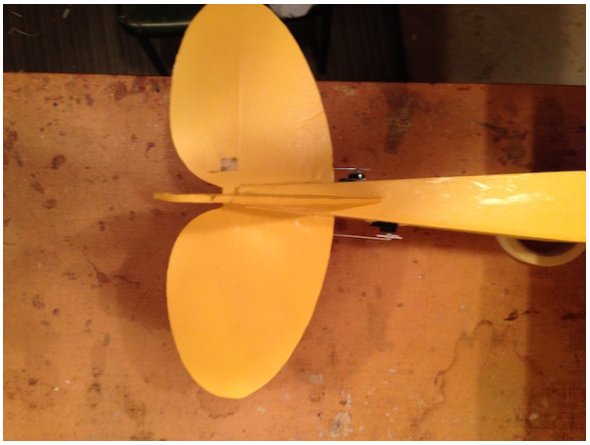
4-channel Flight 2:
Because there were several planes in the air during the second flight, the flight was not as full aerobatic as the first as avoiding other aircraft was more important than “ringing” out the plane to its full potential. The wind had picked up considerably and was now about 10 mph. The flight was a timed 6 minutes.

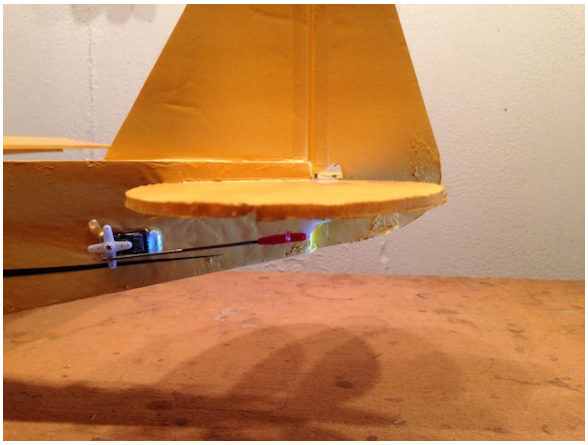
The battery was recharged at home and the charger indicated 483mAh returned to the pack. That yields 80.5mAh per minutes.

1040mAh divided by 95 mAh per minute = about 11 minutes.
I’ve now set my timer to 5 minutes to do two 5 minute flights on the 3S 1300mAh pack.

For storage, both packs were discharged to about 3.77V per cell or about 11.31V for the pack.

With the transmitter trims for the ailerons, rudder and elevator in neutral/zero, the physical trim for the 4-channel version for the rudder and elevator is shown in the photos.





Just a few links I left here from my own reference:

Frearson screw drive
https://en.wikipedia.org/wiki/List_of_screw_drives#Frearson

Staples 4 mil. Filament Tape, 0.9"W x 60 Yds. L, 3" Core (467886-CC)
https://www.staples.com/Staples-Fiberglass-Filament-Tape-0-9-x-60-Yards/product_467886

FT arming problem solution:
https://youtu.be/ce81bDdOn0M?t=34