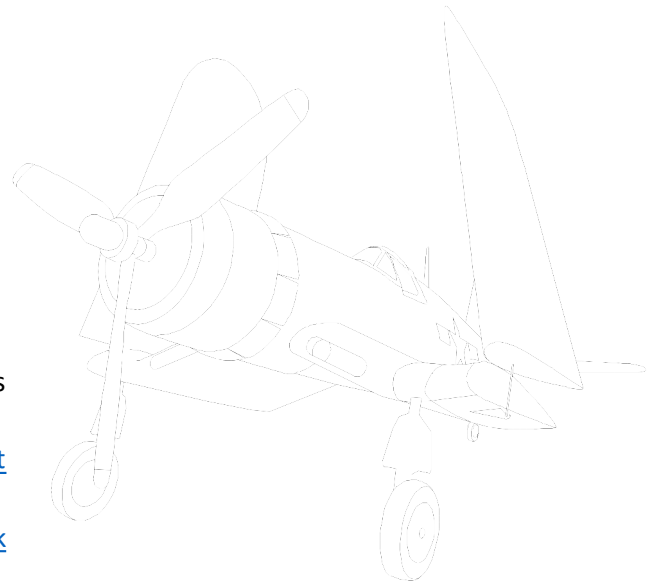


32 Inch F4U-1A Corsair

Construction/Covering Notes

Designed By Derek Micko 2024

All Rights Reserved



Preparation

- Additional details can be found in the prototype's build thread:
[Park Flyer Fun Scale Models Chance Vought F4U-1A Corsair](#)
- Flying and detail videos can be found here: [Park Flyer Fun Scale Models F4U-1A Corsair Videos](#)
- Before starting construction, it is recommended to review/decide on the following items ahead of time.

Plans Review

- Thoroughly review the plans and detail drawings. Note the order of construction, as it is important to follow to ensure success.
- There are four sheets of 24" x 36": Fuse, Retract/Folding Wing, Standard Wing, and Parts plans.

Wing Options

- The builder can choose between two wing options
 - Standard Wing (SW)
 - Option to add Plug-In Landing Gear
 - Requires two 4.3g servos (ailerons)
 - Retract/Folding Wing (RFW)
 - Option to build with servo operated folding wings
 - Two 9-gram metal gear servos needed.
 - Inline servo speed reducers (x2) needed (unless the builder's transmitter allows for speed reduction).
 - Two Servo Angle Expanders to allow the servo to move 180* (most servos only move 90*).
 - 3D printed parts Control Horn Wing (CHW) and Hinge parts (H1-H3) available from www.rabidmodels.com
 - Option to build with 90 degree rotating mechanical retractable landing gear
 - Two 4.3-gram metal gear servos are needed.

- Inline servo speed reducers (x2) needed (unless the builder's transmitter allows for speed reduction).
- 3D printed retract units available from www.rabidmodels.com

Balsa, Parts, And Other Materials

- The builder can cut their own parts from the "Parts Plan", or they can purchase a short kit from www.manzanolaser.com
- The model features stringers of 3/32" square balsa. These can be purchased individually or cut by using a balsa stripper. Additional 3/32" stringers from basswood are used.
- Several details are made from standard cardstock.
- Additional building materials needed (some of the material needed is provided in the short kit's parts):
 - 1/8" lite ply (motor mount, ribs, and details).
 - 1/16" balsa sheet (cross decking sheeting on the fuse).
 - 3/32" balsa sheet (formers, ribs, tail feathers, stringers, trailing edges, hatch rails, and scrap).
 - 1/4" balsa sheet (leading edges and scrap).
 - 1/16" ply (battery tray/mount if needed)
 - 1/32" wire (control rods).
 - .047" wire (pin hinges, steerable tail wheel, and elevator connector).
 - 1/16" wire (landing gear struts).
 - CA Hinges.
 - .047" (1.2mm), 1.5mm, and 1/16" drill bits (for the retracts).

Power And Electronics

- The model is powered by either:
 - 24-gram 1300 KV (for the Standard Wing version) brushless motor.
 - Emax CF2822 39-gram 1200 KV (for the Retract/Folding wing version) brushless motor.
 - 15-18 amp ESC.
- The battery used on the prototype was 3S 1200 mah pack.
- The propeller used is either:
 - 3-blade 9"x 7" for the Standard Wing version.
 - 3-blade 9.5" x 7" for the Retract/Folding Wing version (the Flightline B-24 prop was used).
- www.rabidmodels.com offers a power pack that includes the motor, prop, 3D printed hub, ESC, and additional accessories. Also available are 3D printed wheels, tires, strut covers, retracts, control horns, and wing folding parts specifically designed for the model.

Servos And Servo Extensions

- Except for the wing folding servos (9-gram MG) all are 3.7- 4.3 grams.
- Inline servo speed reducers (2 for the retract servos and 2 for the wing folding servos- 4 total) needed (unless the builder's transmitter allows for speed reduction).
- Two "Servo Angle Expanders" to allow the servo to move 180* (most servos only move 90*). These are similar to servo lead extensions and plug in-line between the servo and receiver.

Canopy

- The canopy is made from several templates of paper and thin clear sheet; 3mil was used on the prototype (the clear plastic on a report cover can also be used).
- There are commercially available canopies should the builder wish to go that route.

Covering

- The prototype was covered in printed tissue and the patterns can be downloaded along with the plans on www.modelaviation.com The patterns can be printed on standard "Free Flight" tissue or for more durability and color saturation on exam table paper (crepe or smooth).
- The model can also be covered in lightweight iron on film.

Construction

Retract/Folding Wing (RFW)

- If building the Standard Wing, the main difference is the construction of Wing Panel 3, and Panels 4 and 5 are built as one piece (for a total of 7 panels). Review the plan details but the overall build process is similar.
- The RFW is built in 9 panels and then glued together once each is completed.
- Cut the Leading Edge (L.E.) blanks from medium 1/4" balsa using the templates on the plans. Note the dashed lines indicate the area removed once the wing is off the building board.
- Cut the Tailing Edge (T.E.) planks from medium 3/32" balsa.
- Use wax paper or clear film over the plans to protect them from glue.

Wing Panel 1

- Bevel the rear of WMP4 (per the plans) to match the rear contour of W1.

- Pin the L.E., S1, S2, and WMP4 in place over the plans.
- Sand/bevel the bottom edges of the W1s so that they sit flat on the building board- use the spars/W1 Angle Guide to set the angle.
- Set the ribs and WMP2 in place- use the angle guide to assist before glueing the assembly.
- Add the 3/32" sqr. balsa stringers- trim and sand flush with the ribs.
- Add 3/32" scrap on top of WMP2 on the insides of the W1s (this will provide more support for WMP2)- sand to the contour of W1s.
- Add 3/32" scrap forward of WMP4 and sand to the height of the ribs.
- Sand the tops of the ribs to be parallel with the building board.
- Trim/sand the sides of the L.E. to be even with the sides of the W1s.
- Sand/shape the top of the L.E. per the plans/guides- do not contour the bottom.

Wing Panel 2- Right

- Sand/bevel the bottom edges of W2 and W4 so that they sit flat on the building board- use the spars/W2 and W4 Angle Guides to set the angle.
- Glue the Leading Edge parts (x3) together. Pin in place over the plans- note the orientation.
- Slot S3 and S4 into W3 and pin in place over the building board.
- Add W2 and W4 using the applicable angle guides- add the T.E and glue the assembly.
- Add the 3/32" sqr. balsa stringers- trim and sand flush with the ribs.
- Sand the tops of the ribs to be parallel with the building board.
- Trim/sand the sides of the L.E. to be even with the sides of the W2/W4.
- Sand/shape the top of the L.E. per the plans/guides- do not contour the bottom.

Wing Panel 3- Right

- Cut six (6) 1" pieces of 1/16" wire to make the guide pins.
- Glue the four (4) W6 Spacer parts together- use two of the guide pins in the 1/16" holes to ensure alignment- do not glue the pins in place.
- Glue the four (4) W6 and the W7 parts together- use two of the guide pins in the 1/16" holes to ensure alignment.
- Slide the W6 Spacer in place (do not glue)- the 2 guide pins go into the applicable holes in W7. Add the final guide pin into W7.
- Slide the forward and rear section of the two (2) W5s in place and glue to the W6/W7 assembly. Do not glue to the W6 Spacer. The full assembly should sit flat on the building board.
- Once the assembly is dry, sand the top/bottom to uniformity. The alignment pins can be removed, and the 6 Spacer can be set aside for the construction of the other panel.
- Glue two (2) RMP1s together (one on top of the other)- make two (2) sets.
- Glue one (1) RMP1 assembly to the lower forward section of W5.
- Glue one (1) RMP1 assembly to the lower forward section of W7- there will be an overhang on the outside edge of W7 that will be glued to W8 when the panels are joined.

Wing Panel 4- Right

- Glue S5A to the forward face of S5 per the etching/markings- note the orientation for the angle of W8. Repeat the same for S7A and S7.
- Glue the two (2) S6s together.
- Pin the L.E., T.E. over the plans. Set W9 in place and slide the S5 and S7 assemblies into the applicable slots in W9. Glue all together ensuring the spars and W9 are 90* to the building board.
- Bevel the bottom of W8 so that it is flat to the building board when angled against the spars- glue in place.
- Add the 3/32" sqr. balsa stringers- trim and sand flush with the ribs.
- Glue the S6 assembly in place.

Wing Panel 5- Right

- Glue S8A to the rear face of S8 per the etching/markings. Repeat the same for S9A and S9.
- Glue the two (2) Washout Jigs (WOJ) together.
- Gently bend/crack the two (2) Aileron Leading Edge parts (ALE) along the etch line so that they match the angle of the aileron's leading edge- glue together.
- Glue T1 to W15- using the etch marks to match up with the stringer notches- make sure they are 90* to each other.
- Glue the Aileron part to the forward edge of the L.E. per the plans- note the cutout for the control horn. Rabid Models offers 3D printed control horns for the model. If using a different horn, the notch can be filled in with scrap. Glue the outer edge of this assembly to the applicable location (per the plans) to the W15/T1 assembly.
- Pin the WOJ in place over the plans. The two (2) Wing Tip Guides (WTGs) can also be pinned in place- scrap can be added to their rear for additional stability if desired. Place magic (clear) tape over the tops of the WOJ and WTGs to protect them from glue during construction.
- The plans and L.E. template show an option to add 1/4" aluminum tubing for gun barrels. This will allow 3mm flashing LEDs to be added later into the tubes and can be actuated by an additional channel to simulate gun flashes. Installation is the builder's choice and there are multiple options for the lights. If adding the lights, it's recommended to add the ply parts located near W10/W11 to the rear of the leading edge blank and drill out the applicable holes prior to adding the LE in place. If not building with the lights, the ply parts and holes can be omitted.
- Apply window cleaner with ammonia to the backside of T1 (the ammonia will make the balsa more flexible). Let it set for a few minutes before pinning the assembly in place. Add the push pin over the T.E. near the rear of W13 (per the plans). Add an additional push pin through T1 so that it conforms to the shape of the WTGs. The tip of T1 should curve up as it sits on the WTGs.
- Starting at the outward edge of the ALE and moving inward, glue it to the leading edge of the Aileron part.
- Add parts T2-T5 to T1, keeping the appropriate curve in T1.

- Pin W10 and the L.E. in place before glueing them to the wing assembly. Add 1" T pins against the forward edge of ALE- this will create a 1/32" spacing between the ALE and stringer #5. Do the same for the inner edge of the aileron and W12A.
- Slide the bottom 3/32" stringers in place between W10 and W15- note the stringer #2 is from basswood. Thin shims may be needed under some of the stingers, so they are fully into the notches of W15. Add WLP2 in place- note the stringer that notches into the inside edge.
- Add ribs W14 and then W13- glue in place 90* to the board.
- Slide WSMP into the slot in W11 and W12 and set in place. Slide the S8/S9 assemblies into the slots in W10. Slide the W11/W12 ribs against the edge of S8/S9 before glueing the WSMP, W11/W12, and S8/S9 in place.
- Make the aileron servo mount from scrap 3/32" and glue in place.
- Test a 4.3-gram servo. Add the horn so that when the servo is neutral, the horn is 90* to the side (making it extend beyond the bottom of the wing when orientated per the plans). With no power to the servo, carefully rotate the servo so that the horn is now parallel to the body. Glue the servo to the mounting plate per the plans.
- Add T6 with 1/32" spacing in front of ALE on T1. Add T6A and W12A per the plans before adding the top 3/32 stringers (note #2 is basswood).
- Make the aileron ribs from scrap 3/32" balsa cut to height- these will be shaped once the wing is off the building board.
- Remove any excess stringers and sand flush with the side of W10.
- Unpin wing Panel 5 Right from the building board before shaping the aileron ribs and T6A.
- Tape Panel 4 and 5 together. Place masking tape over the top of the ribs right behind the L.E.- this will help protect them while shaping the L.E.
- Shape the L.E. with a block plane and finish with sandpaper (120-220 grit). There are Leading Edge templates to help with shaping. Remove the tape separating the panels.
- Round the wing tip and trailing edges.
- Mark the hinge locations and the aileron cut out on ALE/T6A before cutting through- do the same with the L.E. at W12A.
- Infill between the top/bottom #5 stringers between W12A and W15 with scrap.
- Round the leading edge of the aileron.
- Cut slots for the CA hinges (temporary hinges can be made from cardstock) test fit but do not glue.

Wing Folding Hinges- Right

- Wing Folding Hinges are available from Rabid Models. There are a right and a left hand set. Each set is made up of two (2) H1s, one (1) H2, and one (1) H3.
- Carefully drill out the hole for the hinge pin in H1-H3 with a .047" drill bit (a 1.2mm bit can be used). Do Not Over Drill.
- Bend up the hinge pin from .047" wire per the template on the plans.
- Slightly bevel the outside edge of W9 between S5/S7- do the same on W10. This will create a channel for the hinge pin.

- Wing Panel 4- Slide the H1 in place in front of S5- it should sit on top of S5A and the center of the pin hole is even with the outside edge of W9. Slide in place H1 the same in front of S7.
- Wing Panel 5- Slide H2 in place to the rear of S8- it should sit on top of S8A. Slide H3 in place the same way onto S9.
- Slide Panel 4 and 5 together- W9 and W10 should be flush against each other, WLP2 should slide through the slot in W9, and the hinges should line up so that the round tabs are on the opposite sides. Sand/adjust as needed so the two panels sit flush against the other. Slide the hinge pin into the hinges- adjust the hinge halves as needed. Clamp the hinge halves in place and test the wings by manually folding them- adjust as needed. Re-extend the wing panels to be flat.
- Mark the hinge halves that are above the rib line (except for the flange with the round tabs). Carefully trim the tops so they are flush with the top of the ribs.
- With the two panels connected together with the hinge pin in place, tack glue the hinge halves in place (just enough to hold the hinge halves in place)- be sure not to get any glue on the round tabs.
- Remove the pin and separate the panels before glueing in the hinge halves completely.
- Infill the area between top stringer #1 and the hinge half between W8 and W9 with 1/8" lite ply scrap.
- Slide the two panels together and reinsert the hinge pin- mark when the flange rests onto the scrap 1/8" ply. Sand a shallow slot for the pin flange. Drill a small hole for a servo screw to hold the pin in place.
- Flip the two panels over and add WLP1 and WLP1A- be sure not to glue to WLP2.

Wing Folding Servo and Linkage- Right

- With Panel 4 and 5 still connected via the hinge pin, turn the panels over and trim away bottom #2 stringer between W11 and W12.
- Trim out the precut sections of W10 and W11 for the actuating rod.
- Add a "Servo Angle Expander" to allow the servo to move 180* (most servos only move 90*) to 9-gram metal gear servo- this can be added to the servo's connector like an extension. Add a "Servo Speed Reducer" in-line with the angle expander (some radio transmitters (TX) also allow a reduction in servo speed, and this can be used instead of the in-line one).
- Assign the switch on the transmitter for the wing fold and connect to channel 8 on the receiver. Test the servo with the angle expander and speed reducer. The servo should travel 180* and at a slower rate.
- Set the servo and TX switch to the "extended" position. Set the servo on the board, facing with the spline forward and on the left hand side.
- Attach a small EZ connector to the outermost hole of the large servo arm.
- Add the horn so that the EZ connector is nearly touching the table and also on the left-hand side. Action the servo, it should rotate up and to the right 180*- reverse direction if needed on your Tx.
- Position the servo onto WSMP using the etching/marking for the spline mast centerline. The etches/markings on the ribs should align with the hole in the EZ connector. The horn/EZ connector should be pointing towards the wing tip.
- Drill out the hole to be .047" in the Control Horn Wing (CHW)- available from Rabid Models.

- Test fit CHW in place per the plans and attach a .047" wire with a Z bend through the hole. Mark the wire just inside of W12 and trim. Remove CHW/Wire, slide the wire into the EZ connector, and reset CHW/wire back in place. CHW can be attached to S6 with 2 small screws.
- Mount the servo to the WSMP. Servo mounts available from Rabid Models (or basswood blocks can be used). Add the set screw to the EZ connector.
- Remove the cut outs for the wheels in the S7 assembly.

Left Wing Panels

- Build the left wing Panels 2-5.
- Note the wing folding is reversed from the right (wing folding servo is connected to channel 7).

Joining The Wing Panels

- Elevate the center panel (wing Panel 1) 1.125 inches (1 and 1/8") above the board.
- Glue both Panel 2s so that W1 and W2 sides are flush with each other and W4 is flat on the board.
- Remove the hinge pin and separate Panels 4/5.
- Glue panel 3 to 2. Panel 4's W8 is glued flush against W7's side on panel 3- note the RMP1s on W7 will fit into and are glued to the cutout in W8.

Retract General Information

- Scale 90* rotating mechanical retracts are available from Rabid Models.
- Retracts are actuated by a 4.3-gram metal gear servo.
- Retract pivot pin and landing gear strut are from 1/16" (.0625") wire.
- Actuating strut is from 1/32" (.0312") wire.
- Scale 3D printed hubs, tires, and wheel collars are available from Rabid Models.

Retract Assembly

- Remove any flash on the printed parts (if present).
- Drill out the main retract frame pivot hole to be 1/16" diameter. Do Not Over Drill.
- Drill out the trunnion pivot hole to be 1.5mm diameter.
- Cut 1/16" wire to be the width of the lower section of the main frame- this will be the pivot pin.
- Bend/cut 1/16" wire so that the long section is 2.875 inches (2 and 7/8s"), and the short section is about 1 inch (see the plans templates) to make the main landing gear strut.
- Z-bend a 2" length 1/32" wire (this will be bent/trimmed later to be 1.25" from the center of the Z bend). Insert the Z bend into the actuating tab on the trunnion- the wire should be on the opposite side of the notch in the trunnion for the pivot bolt (see the plans).

- Insert the pivot bolt into the 1/16" wheel collar- slide the wheel collar/pivot bolt assembly into the slot in the trunnion. Insert the longer section of the main landing gear strut into the end of the trunnion and through the wheel collar.
- Position the trunnion assembly into the main retract frame- the pivot bolt should sit in the curved notch in the top of the frame (the actuating 1/32" wire will be on the bottom of the main frame).
- Slide the pivot pin into one side of the main frame, through the pinion, until it's even with the opposite side of the main frame.
- Test extend the pivot by holding the retract unit and pulling the actuating wire in alignment with the main frame. As the retract trunnion extends, the pivot bolt should contact the rotation mast on the main frame, causing the main landing gear strut to rotate. As the trunnion is retracted, the pivot bolt will hit the top of the main frame and rotate back to its original orientation. Adjust the alignment of the main strut axle by tightening the pivot bolt. If the actuation is sticky, apply some graphite via a pencil in the area needed. Another option can be to lightly scrape the outside top edge of the main frame rear of the rotation post.

Retract installation

- Test fit the retract unit on top of the RMP1s in W5/W7. The rotation mast should be on the side of the fuse. Mount with small four (4) small screws.
- Test the 4.3-gram metal gear servos. These will each need a servo speed reducer added (or done so with the TX). The retract servos will be connected into channels 5 and 6 on the receiver- each will need to have the End Point Adjustments (EPA) to get the best performance from each retract.
- Trim off the mounting tabs on a 4.3-gram metal gear servo, and test fit in the cut-outs in W4-W6 so that the servo mast is forward (per the plans)- adjust cut-outs as needed for best fit.
- Assemble the servo mount from parts SM1-SM3. Test fit to W4 so that the top of the mount is flush with the W4 cut-out. Mount the SM1-SM3 in place with 2 small screws.
- Set the servo back in place orientated per the plans and connect to the receiver. With power to the servo (including a speed reducer connector or set up on the Tx), move the appropriate switch so the servo is in the "extended" position".
- Bend the 1/32" actuating wire 90* at 1.25" so that it can slide into the #2 hole of the servo horn. Add a Dubro EZ link to secure the wire to the horn and trim off any excess wire overhang.
- Connect the horn to the servo with the gear in the extended position- this should put the horn facing the rear of the wing at the 25-30* angle below level on the servo (reverse servo direction if needed). Lift the servo off the mount and add the horn screw.
- Add magic tape to the underside of the servo and top of the mount. Apply thick CA and position the servo back in place. The tape will allow the servo to be removed from the mount later if needed.
- Test the servo and use the end point adjustments on the Tx to fine tune the extension and retracted points.
- Mount the wheel and wheel collar; trim the excess end of the axle.
- Add the W6 Spar (W6S) against the wheel well cut-outs in the W5 and W7, between W4 and W8- glue when satisfied with the fit.

Finishing the RFW Construction

- Panel 1- add the S1As and S2As to the applicable spars per the plans.
- Cut a strip of 1/8" balsa 3/8" wide- trim to length and glue to the bottom of wing Panel 2's L.E.
- Add the scraps per the plans to make the bottom of the wing intakes. Round the bottom to match the plans.
- Mark/ID the servo leads and run them through the wing to Panel 1- making sure there is some slack/flexibility of the wires at the wing fold point.
- Add scrap 1/8" lite ply on the bottom of the wing between W8/W9 and W10/W11 between the rear of the L.E. and the forward edge of #1 stringer. Blend to the contour of the bottom of the wing. An additional support strap can be added here when flying- see the plans.
- Re-add the hinge pin and drill a pilot hole through WLP2 and WLP1 - add a screw to secure the wing in the extended position. Remove the screw from the wing to allow for additional retraction testing.

Fuselage and Empennage

- Use wax paper or clear film over the plans to protect them from glue.
- Glue parts F4A/F4B, F7A/F7B, F12/F12A, HMPs (making 2 sets), and F15- be sure to utilize the etch/markings to make a left and a right set.
- Round the forward edge of F3 per the etch/markings under the #1 stringer before gluing to F4.
- Add the 3/32" stringers in the cut-outs of V1 and V2- sand flush. Mark and cut the slots for the CA hinges (per the plans). Temporary hinges made from cardstock can be used for testing before adding the CA hinges after covering is complete. It's best to shape/round the outside edges at this time. Rabid Models has tools for cutting the hinge slots and for rounding the edges. Remove V2 and set aside for now.
- Add the 3/32" stringers in the cut outs of H1 and E2- sand flush. Mark and cut the slots for the CA hinges (use cardstock ones at this time).
- Add the .047" "U" shaped wire to connect the elevator halves. Round all exterior surfaces
- Pin K1-K5 in place over the Keel plan, adding the vertical stringers between the top and bottom keel parts, and the horizontal stringers. Note all are 3/32" unless otherwise noted. Add V1 into the slot in K2. Glue the assembly.
- Lightly sand the top surface of the keel assembly to even out the surface with 150 and then 220 grit sandpaper.
- Identify all the left side former halves (if not noted, either half can be used).
- Glue F14- F12 in place on top of the vertical stringers (use the etch/markings for alignment)- making sure they are 90* to the board.
- Add the HMP assembly into the notch in F12/F13.
- Add formers F11, F8, and F3/F4 assembly. Starting at F13 and moving forward, add the center/#5 3/32" stringer in place. View down the length of the stringer to ensure it is straight before glueing in place.
- Add the rest of the formers F10 to F1 and CR3, using the etch marks and the center stringer for alignment.

- Test fit the wing saddle (WS)- it should fit under the center stringer and into the cut outs in F4B and F7A- sand as needed for best fit. Apply window cleaner with ammonia to the outside of WS (the ammonia will make the balsa more flexible). Once pliable glue to the center stringer first, and then curve to F4B and F7A.
- Make the lower hatch rail from 3/32" sheet cut to width- see the Fuse Top View plan for templates. Glue in place between F5 and F8.
- Add the remaining stringers except the top two between CR3 and F6. These will be added once the other fuse halves are added.
- Use masking tape around the lower hatch rail and HMR to protect the fuse while contouring them with a block plane and then a sanding block.
- The Servo Mounting Rails (SMRs) can be added per the plans (note the notch for servo mounting clearance is in the inside).
- Lightly sand the overall structure before removing it from the board.
- Add F1A to the rear of the right-hand side F1- note the etching/markings and the center hole alignment (the center hole is offset to the right when viewed from the front).
- Repeat the same process/order adding the right-hand side former halves.
- Mount the motor with the 1/32" shim per the plans (see the F1 detail and Top Plan views). Remove and set aside for now.
- Test and mount two (2) 4.3- gram servos per the F8 detail.
- Add the 1/16" balsa cross decking on top of the center stringer per the plans.
- Place magic tape on the rear face of F5, the lower hatch rail, and the forward face of F8. This will help prevent the hatch parts from being glued to the fuse.
- Add the 1/8" x 3/32" round magnets into F5/F5A and F8/F8A- note the polarity.
- Make the upper hatch rail per the plan details and set in place.
- Set F5A, F8A, in place and glue to the keel and upper hatch rail.
- Add the remaining stringers.
- Remove the magic tape and blend the hatch rails to contour the fuse (using the same process used for the lower hatch rails).
- Cut the hatch free- sand as needed.
- Add the scrap cross piece for in front of F8A per the plans. Tape the rear face of F6 and forward face of F8. Glue C5 to F6 and F8A per the Top View detail.
- Add the hatch back onto the fuse and glue C1 and C2s in place (do not remove the center pre-cut section of C1 at this time). Tack glue C3 and C4 to the tape and the pre-cut section of C1. These will be used when making the canopy and removed later.
- Add CR1/CR2 to both sides and contour to match the plans.
- Add the F15 assembly in place and shape.
- Remove the pre-cut section in K2/K3 for the steerable tail wheel. Add the 3/32" square brass tubing and test fit .047" wire per the plans.
- Cut out the section of the rudder (V2) for the horn and .047" wire- use 1/32" ply or plastic on either side to box in the wire.
- Add the WMP1/1A and WMP3/3A parts in the wing saddle area.

Preparing For Covering The Model

- Sand the model (wing, fuse and tail) to remove any rough areas and glue spots.
- Paint the interior of the cowl and the area between F2/F4 a dark grey.
- Paint the cockpit/hatch area and wheel wells Interior Green.
- Paint the wing L.E. intake interiors (blue on top and white on the bottom).
- Test fit the horizontal and make sure it is 90° to the vertical- adjust as needed.
- Test fit the wing and make sure it's true before drilling 1/16" holes and mounting with four screws.
- Remove the wing and mount the receiver per the plans. Run all the servo extensions and test fit the wing to ensure all wires are contained.
- Test fit the 1/32" wire elevator and rudder pushrods into the applicable holes in the formers- box in their exit points with scrap.

Tissue And Covering Instructions

Tissue details and prep work

- All templates are printed on white tissue or "exam table" paper (crepe or smooth can be used).
- Adhere tissue to 8.5" x 14" sheets using temporary spray adhesive.
- Print in color without borders and allow time for ink to dry. If using an ink-jet printer, lightly coat the sheet with Krylon Crystal Clear spray to help seal the ink (if using a laser printer this step is not needed).
- In general, trim along part outline while still attached to the sheet, carefully remove paper sheet before applying to model.
- The tissue is attached using a glue stick- those that are purple and dry clear are recommended; at least two sticks will be needed.
- Use the marks on each end of the tissue template- they are spaced 3/32" apart and line up with stringers. Each panel notes its location.
- As much as possible, pull-out wrinkles before the glue stick dries. A fine emery board or tweezers can help pull taught before the glue fully dries. Rubbing alcohol on a paint brush can be used to loosen up the glue if it has set and additional adjustment is needed (test the alcohol on scrap printed tissue to ensure it does not make the ink run).
- When covering sheet (solid) surfaces, it's best to apply the glue to the entire surface of the sheet (i.e. the entire horizontal part). If covering an open frame structure, apply the glue to the outside framing and any internal areas needing adhesion (i.e. the wing and the servo mounting plate). For more complex shapes (compound curves), glue can be applied to both the surface and the tissue before application (i.e. front on the cowl).
- Allow the glue to fully dry (1-2 hours). To tighten up any wrinkles, use a very fine mister to dampen the tissue. Hold the model above your head and spray "up" with the mister. This will prevent any large water droplets from hitting the tissue and possibly make the ink run. Another option is to use an airbrush with water in the paint tank to provide a fine mist. As the tissue dries it will shrink and tighten the tissue. A hair dryer can also be used to help with the water evaporation in difficult areas.

- Once the tissue has been shrunk, seal the tissue with several coats of Krylon Crystal Clear Spray. Dusting the first couple of coats, before increasing the amount of spray, allowing each coat to dry before adding the next. The hair dryer can help keep the tissue taught during this process.
- Additional information on covering with printed tissue can be found here:
[FSM Printing on tissue Ki 27 Nate](#)
 And here
[Fun Scale Models Printed Tissue Techniques Part 2](#)

Covering the RFW- Panel 5

- Locate the Aileron Bay Leading Edge templates on Tissue Sheets 7 and 8- cut along the outside perimeter and remove the backside. Apply to the aileron bay in wing Panel 5- the color separation line is even with the slots for the hinges. The ends wrap around W12A and the tip.
- Aileron Leading Edge templates on Tissue Sheets 5 and 6- these are added to the aileron leading edges with the color line aligned with the hinge slots. The ends wrap around the outside edges.
- Add the temporary hinges and add the ailerons to the wings. Place wing Panel 5 on the building board and add WOJ under the aileron/W15 per the location on the plans. Secure the aileron in place with pins on each end to keep it from moving- the panel will be covered with the aileron in place.
- Cut out the W10 “wing side” templates on Tissue Sheets 9/10. Add to the applicable rib side.
- Trim the Wing Panel 5 bottoms from Tissue Sheets 5 and 6. Dry fit the panel in place using the tick marks to align with stringer #2. The rear of the template should overhang the trailing edge by roughly 3/32” (thickness of the trailing edge).
- Apply the glue stick around the bottom of W10, the L.E., T.E., the edges and bottom of T1, the aileron servo (mounting plate, stringers #3/4 and W12/W13), and the wing folding servo bay (bottom of W11/W12 and stringers #1/3).
- Use the tick marks to align and set the panel in place, gently pulling it taught from end to end and then front to back. Try to remove any major wrinkles at this time- reposition as needed. Use a popsicle stick to rub down/burnish the template along the outside edges of the panel, around the servo locations, the wing tip, and stringer #5 of the aileron bay. Burnish the gap between #5 and the aileron leading edge, along with the aileron itself. Wrap the template around the T.E. and wing tip (apply additional glue and trim as needed).
- Set the wing panel on the building board with the WOJ in place and add weights so that it sits flat on the board (except the area around the WOJ). Allow to dry.
- Remove the pins holding the aileron in place.
- Add the top templates to Panel 5 the same way as the bottom (templates on Tissue Sheets 7/8).
- Set the panel back on the building board over the WOJ and add weights so that it sits flat on the board (except the area around the WOJ). Allow to dry.
- Lightly mist the top template (still weighted on the board with the WOJ) and allow to air dry and shrink/tighten the template (a hair dry can be used to help remove large wrinkles).
- Once shrunk, remove from the building board and shrink the bottom.
- Cut the aileron free along the rear of stringer #5 and the aileron bay. This will leave excess/overhang on the aileron.

- Remove the aileron and glue down the overhang.
- Remove the temporary hinges and replace with CA hinges trimmed to match the sizes on the plans. Tack glue the hinges in place in the aileron (do not fully glue).
- Reinsert the ailerons into the bay- do not glue at this time.
- Seal the tissue on the panel with Krylon Crystal Clear spray. Spray several (2-3) light (misting) coats, allowing to dry before adding an additional 2-3 heavier coats.
- Trim away the tissue around the wing folding servo (bottom of W11/W12 and stringers #1/#3) and a slot for the actuation pushrod.

Covering the RFW- Panels 1-4

- Remove the retracts and set aside at this time.
- Paint the inside rib area around the retracts white and the wheel well area interior green (if not done so already).
- Cut out the wheel well cardstock templates from Paper Template sheet 2. Fold along the green line and test fit- adjust the notch as needed before glueing in place.
- Cover the bottom of Panels 2-4 with unprinted white tissue (this will help with the “opaqueness” of the white). Shrink the unprinted tissue.
- Cut out the W9 “wing side” templates on Tissue Sheets 9/10. Add to the applicable rib side.
- Reinstall the retracts and run their wire leads to Panel 1
- Locate Panel 4 and 3 bottom tissue templates on Tissue Sheets 5 and 6. Test fit, and trim as needed before glueing template 4 and then 3 in place (only the section aft of the wheel well is needed for panel 3).
- Panel 4 top is on Tissue Sheets 7 and 8. Trim as needed for the hinge tabs before glueing in place (do not add Panel 3 top at this time).
- Cut a strip of standard white paper the width of wing Panel 3, and length from the front of the panel to just past the retract servo cut out.
- Test the retracts again to ensure they are operating properly before glueing the paper in place (but not to the servo)- this will allow the top tissue template a surface to adhere.
- Glue the Radiator Intake from Paper Template Sheet 3 in place to the rear of the L.E. of Panel 2.
- Re-connect Panel 5 to Panel 4 with the hinge pin. Slide the servo connectors through the rib cutouts into Panel 1. Make sure there is slack for the wires when the wing folds.
- Connect the wing folding actuation wire to CHW and re-mount it in place with two screws.
- Connect the retract and wing folding servo to the receiver, making sure the speed reducers are connected, and the travel expander is on the wing folding servo. Test both and adjust as needed.
- Add Panel 2 bottom (Tissue Sheets 9/10) and top templates.
- Top Panel 3 (Tissue Sheets 7/8) can be added over the frame and paper. The darker section is the rear (anti-slip of the full-sized aircraft).

Completing the Wing

- Shrink the tissue on the wing and then seal with Krylon Crystal Clear spray. Spray several (2-3) light (misting) coats, allowing to dry before adding an additional 2-3 heavier coats.
- Glue the wheel well covers (Paper Template Sheet 3) in place with canopy glue (this will allow easier removal later if needing to access the retract servo).
- Rabid Models offers landing gear strut covers and wheels designed for the model. Details on how to finish can be found here: [Finishing And Painting 3D Landing Gear Covers And Wheels](#)
- The front gear doors are found on Paper Template Sheet 3. These have both a front and rear. Cut along the outside box line and then cut along the bold line to make 2 sets. Fold along the dashed line and glue the two halves together (making a front and rear).
- Trim along the front side and test fit against the face of the trunnion with the gear extended. Trim as needed for wheel/retract clearance and glue in place (PVA was used on the prototype).
- Add the servo bay/wheel well covers on Paper Template Sheet 3 to close in wing panel around the actuating servo.

Covering the Horizontal and Rudder

- Remove the rudder templates from Tissue Sheets 11 and 12. Apply to the applicable sides- use a popsicle stick to burnish it around the 1/32" doubler.
- The templates can be added to V3 (sub-fin)- there will be overhang on the bottom- do not trim.
- Remove the horizontal and elevator templates from Tissue Sheets 11 and 12. Add the bottom templates to the elevators- trim out around the .047" U connector wire. Mark the locations of the hinge slots.
- Add the bottom template to the horizontal (this can be cut along the center line if needed for easier application). Mark the locations of the hinge slots.
- Cover the top of the horizontal and elevators the same way. Re-cut out the hinge slots. Do not add the hinges/U connector wire at this time.
- Shrink the tissue (if needed) and then seal with Krylon Crystal Clear spray. Spray several (2-3) light (misting) coats, allowing to dry before adding an additional 2-3 heavier coats.

Covering the Fuselage

- There are seven (7) main fuselage templates (for each side), two (2) for the vertical stabilizer, two (2) for the hatch, and several details.
- Dry fit the templates and trim as needed before applying.
- Apply the right side panels and then the left; moving forward.
- Fuse panel 7 is added first and is located on Tissue Sheet 3 and 4. The tick mark is used to align with the center stringer (#5) of F11, and the slot/cut out of the horizontal assists with the rear alignment (it is recommended not to cut the slot for the horizontal in the template at this time- use light from behind to assist in positioning) Test fit and trim as needed.

- Apply glue to F11, the top and bottom keels/infill near the vertical, HMR, F13A, and F15. Position the right side template as described above and attach to the frame. Trim the rear of the panel as needed to best fit F15- slits cut can help smooth the application without wrinkles.
- Re-insert (if it had been removed) the 3/32" brass square tube behind F12 (note it will extend below the fuse per the plans). Glue in place.
- Add the left side fuse panel 7 (trim as needed for the brass tubing)
- Add the vertical templates- the bottoms should overlap onto panel 7.
- Cut a hole and push the 1/32" wire pushrods through (rudder and elevator).
- Test fit right side fuse panel 6 (Tissue Sheet 4) and trim as needed. Use the alignment ticks (on the center stringer) and color lines for the best fit. Add glue on the top and bottom keel, and F10/F11 (protect fuse panel 7 by using low tack tape or scrap paper when applying the glue stick to F11). Apply the panel and repeat the same for the left side (Tissue Sheet 3).
- Fuse panels 5 and 4 are applied the same way.
- Fuse panel 3 (Tissue Sheets 1 and 2) covers F8, F7A/B, lower hatch rail, and F6. Test fit and trim. Apply glue to all mentioned formers, the top edge of the lower hatch rail, and the wing saddle (WS).
 - Note- fuse panel 2 on Tissue Sheet 2 is incorrectly marked as *3 right*.
- Fuse panel 2 (Tissue Sheets 1 and 2) covers F6, lower hatch rail, and F3/F4. Test fit and trim. Apply glue to all mentioned formers, the top edge of the lower hatch rail, and the wing saddle (WS).
 - Note- fuse panel 2 on Tissue Sheet 2 is incorrectly marked as *3 right*.
- Fuse panel 1 (Tissue Sheets 1 and 2) covers F2, F1 and the cowl (CR3-CR1). The space between F3 and F2 is open and will later be covered by the cowl flaps.
- There are dashed lines that need to be cut to allow the template to wrap around the curves of the cowl. Before attaching the template, apply glue around the edge of F2 and the surface of the cowl rings (including the cowl rings interior). Apply the tissue to F2 and the center stringer at CR3. Starting at the bottom of the cowl, gently peel back the tabs, apply glue to the backside of the tabs, and then wrap them over and into the cowl, burnishing them down and moving upwards and on to the next one. Each tab should slightly overlap the previous.
- The Cowl Flaps are located on Paper Template Sheet 4. These are folded and glued along the color separation lines- making a front and back.
- Cut 1/16" balsa sheet into 3/32" squares and glue these to the stringers to be even with F3. Paint them the same gray color as the stringers in this area.
- Add a slight curve to each flap to match the contour of the cowl. Starting at the top, glue the cowl flaps to F2 and the 3/32" squares (the very top of the cowl does not have a flap). Be sure to match the flap with the color change on the cowl. Flaps were attached using PVA on the prototype.
- Shrink the tissue on the fuse and add the Star and Bars and lower cowl details before sealing with Krylon Crystal Clear spray. Spray several (2-3) light (misting) coats, allowing to dry before adding an additional 2-3 heavier coats.

Canopy and Hatch

- Trim the Hatch template (Tissue Sheets 3) with excess tissue around the perimeter. Cut out the Canopy Cover from Paper Template Sheet 2. Use the tick marks on the forward edge of the Canopy Cover to glue the paper template to the backside of the Hatch tissue template. The forward edge

of the Canopy Cover should be even with the panel line in the Hatch. The end result will be the Hatch color on one side, and the opposite side will be the green paper of the Canopy Cover.

- Paint the canopy interior/framing (C1, C2 F8A, and upper hatch rails) interior green.
- Trim the curved section and ends of the Hatch template. Test fit the template on top of the hatch using the keel (K1) for alignment. Trim the sides and front before attaching.
- Shrink the tissue on the Hatch before sealing with Krylon Crystal Clear spray. Spray several (2-3) light (misting) coats, allowing to dry before adding an additional 2-3 heavier coats.
- If using a commercial canopy, the following steps can be skipped
- Print out the canopy frames on Paper Template Sheets 1 and 2. Cut out the Top Canopy, Main Canopy, and Front Windscreen along the box outline. Lightly score along the dashed line before folding. Re-open and apply glue to the backside (several dusting coats of spray adhesive were used on the prototype) before folding again to make a front (blue) and backside (interior green). Allow to dry thoroughly.
- Cut out the “glass” sections from each panel (a pin in each corner first helps with creating a clean cut-out).
- Spray the backside (green) of each template with spray adhesive and then apply to thin clear sheet (3 mil sheet was used on the prototype, but the clear front of a “report cover” can also be used). The blue side will be on top with the clear plastic under and across the full green side of each template. Allow to dry.
- Trim the Front Windscreen and the Main Canopy along the outside edge on blue.
- Set the Top Canopy over the Top Canopy Cutting Guide- tape the two together. Using a sharp blade, cut along the lines indicated from the dashed to the edge of the template.
- Remove the Top Canopy from the Top Canopy Cutting Guide. Trim the Top Canopy along the edge of the paper/clear plastic, making sure not to cut off the blue section- this is part of the canopy template.
- Gently roll the Top Canopy section over a dowel or marker. Starting at the rear most section, glue the Top Canopy template to F8A and C2 using canopy glue- do not glue to C4 as this is only a form guide. Use the shape of F8A as a guide for the template’s curve when attaching to C2. Allow to fully dry and trim any overhang under C2.
- Repeat this process for each section of the Top Canopy template moving forward (there will be some overlap of the sections)- trim any overhang under C2 once dry.
- Glue the Main Canopy template (left side first) so that the arched section is even with the top of C2, and the forward edge is about halfway onto C1- there will be overhang of this template behind F8A and below the hatch rail. Allow to fully dry. Repeat the same steps for the right side. If the top-rear of the Main Canopy template is too far above F8A, cut and glue with an overlap.
- Glue the Front Windscreen template in place- ensuring not to glue to C3. Allow to fully dry.
- Use a sharp blade or small hacksaw to cut the middle section of C1 free, remove the central cross piece (C5), and C3/C4. Touch up the cut section with interior green.

Mounting the Rudder and Horizontal

- Add the CA hinges to the rudder- tack glue in place.

- Slide .047" wire into the slot in the rudder. Mark and bend 90*. Slide into the .047" wire into the square brass tube in the fuse- the wire should extend below the tubing outside the fuse. Slide the rudder into the vertical and onto the 90" bend in the .047" wire.
- Bend the wire below the fuse per the plans for the wheel.
- Sand and paint the TW parts white. Glue TW1, TW2, and TW3 in place. The tail wheel is made from two 1/8" lite ply parts glued together cross grained. Sand and round the edges before painting and installing. Rabid Models also has a printed tail wheel option.
- Make a Z bend in the end of the 1/32" wire for the rudder. Add the control horn to this Z bend and fit into the slot of the rudder. Test actuation before glueing in place. Use thin CA to glue the rudder hinges to the vertical.
- Add the sub-fin below the rudder- the bottom tissue will overhand and blend into the fuse templates.
- Cut the slots in the fuse tissue for the horizontal. Slide the U Connector through the slot first and then the horizontal. Make sure the horizontal is 90* to the vertical, and the rear edge is 90* to the fuse center line (when viewed from above) before glueing in place.
- Tack glue the CA hinges into the elevator halves. Slide the hinges into place and the U connector halves into the elevator halves. Use thin CA to glue the elevator hinges to the horizontal.
- Make a Z bend in the end of the 1/32" wire for the elevator. Add the control horn to this Z bend and fit into the slot of the elevator. Test actuation before glueing in place.

Finishing the model

- The receiver can be mounted to the floor of the 1/16" cross decking as indicated in the fuse.
- Mount the motor with the 1/32" shim per the plans- the motor should have between a 1.5-2* right thrust.
- Slide the ESC leads through the fuse and former cut outs. Test to ensure correct rotation direction. Mount the ESC to the side of the fuse per the plan location.
- Test fit the wing in place and connect all servo leads. Cut out the tissue for the aileron servo horns in wing Panel 5s before testing all control surface and model functions. Secure the wing in place when satisfied with all operations.
- Place waxed paper behind F4B, in front of F7A, and over the wing in the belly-pan area to protect it from glue.
- Cut a 3/32" stringer the length of the belly-pan and set on the wing along the centerline.
- Slide sub-formers F4C, F5B, F5C, F6A, and F7C in place and glue - (be sure to not glue to the bottom of the wing or the fuse).
- Add the rest of the stringers to the belly-pan and then gently remove. Sand as needed before covering- first with unprinted white tissue and then the templates found on Tissue Sheet 4. Shrink and seal with Krylon Crystal Clear. The belly pan can be held in place with magnets or with pins (used on the prototype).
- Glue the ailerons/CA hinges in place. Connect the servo horn with a 1/32" wire with a Z bend. Add the control horns to the slot on the aileron bottom. The control wire can be attached to the horn with a micro EZ connector on the horn, or a 90* bend at a horn hole and a Du-Bro Micro E-Z link (used on the prototype) and the wire is trimmed as needed.

- Mount the propeller and hub. The hub is 3D printed and a 5mm nut is mounted into the backside of the hub. Test and “true” the hub by manually spinning the prop- adjust the hub as need before glueing the nut to the hub with CA or epoxy. Techniques to finish a hub or spinner can be found here: [Finishing And Painting A 3D Printed Spinner](#)
- Balance the model with the landing gear extended per the location on the plans. The battery was moved all the way forward on the prototype to balance- no additional ballast was needed. The battery on the prototype is mounted to a 1/16” ply plate to allow it to be slid all the way forward to touch the rear of F4 and is held in place with magnets. If needed, add additional ballast between F1 and CR3 (as low as possible).
- Recommended control throws are the following:
 - Rudder +/- 3/8”
 - Elevator +/- 3/8”- 1/2”
 - Ailerons +/- 3/8”

Cockpit Construction

- The Paper Template Sheets include a profile pilot and cockpit. If not adding, this section can be skipped.
- The cockpit details are made up of the following main sections: Instrument Panel (IP), Pilot, Cockpit Sides (panels), Seat/Stick/Mount, and Fuel Tank Top.
 - The Instrument Panel (IP) can be made in two options- standard or recessed instruments with glass (this requires hole punches with sizes of 1/16”- 5/16”).
 - Standard- Only the “Base” section is needed from the main instrument panels. Trim along the exterior.
 - Recessed instruments- cut along the IP main box, and then cut free the top section (Base). Fold along the line between the IP and the blank section and glue together. Use the multi-sized hole punch to cut out the centers of the instruments. Glue this section on top of clear sheet. Then glue the clear sheet side to the face of the base- using the instruments as location guides. Trim along the outside of the IP assembly.
 - Cut the IP Top Decking from Paper Template Sheet 6 and set in place in the hatch, it should form to the contour of the Hatch template. Glue the IP to the hatch (per the plans on Paper Template Sheet 5) and the Top Decking to the IP.
 - The profile Pilot is on Paper Sheet 5. Follow the instructions on that sheet. Trim the outside of the pilot profile to complete.
 - Cockpit Sides (panels) are made from balsa parts and from templates on Paper Template Sheets 7 and 8.
 - Cut the Cockpit Floor from Paper Sheet 8 and test fit. Trim as needed before glueing to the 1/16” cross decking between F6 and F8.
 - Remove the Cockpit Sides and details below from Paper Sheet 7. Test fit the sides to the insides of the stringers between formers F6 and F8. Trime as needed

- Glue the details to 3/32" balsa (the short kit from Manzano includes these parts). The throttle controls were made from pins on the prototype. Use a black marker on the edges before glueing to the applicable marks on the Cockpit Sides.
 - Use PVA or white glue to attach to the fuselage.
 - Cut the Left and Right Panels and details from Paper Sheet 8. The red center of the detail can be removed with a 1/16" hole punch. Fold the panels along the dashed lines and glue to the Cockpit Side balsa parts (the short kit from Manzano includes these parts). Glue the detail parts to the applicable balsa and then in place over the Panels. The Map Case (Paper Template Sheet 6) can be added to the forward side of the Right Panel. Glue the Lower IP parts to the applicable balsa and then to the front of the corresponding side panels. These can then be mounted into the fuse (they are only set in place on the prototype and are removed when mounting the battery for flight).
- Seat/Stick/Mount- found on Paper Sheet 6 and 8.
 - Cut the seat out long the outside box, fold and glue making a front and rear.
 - Cut out along the seat perimeter- fold and glue along the indicated lines. Add the seat detail to the inside rear base. Glue the seat to scrap 1/4" balsa (painted interior green) and add the magnets per the plans on Paper Template Sheet 5. Cut and fold the Rear Seat Mount and glue to the rear of the seat. Cut out the seatbelts on Paper Template Sheet 6 and add to the seat. The control stick can be made from a dowel and painted black.
- Fuel Tank Top- used to cover the battery area when displaying the model with the hatch removed.
 - Cut out the Fuel Tank Top parts on Paper Template Sheet 8. Glue the Front/Rear to the applicable balsa parts before gluing per the markings to the Battery Bay Cover/Fuel Tank template.
 - The Fuel Tank Top (Paper Template Sheet 6) is glued over the Front/Rear templates making an arched top.
 - This is set (not glued) in place under the hatch between F5 and F6 and can be removed as needed.

Flying the Model

- Recheck all control surfaces are glued to the airframe and move in the correct direction.
- Range check per your radio.
- Secure the wings with the retainer screws and straps. BE SURE NOT TO ACTUATE THE WING FOLDING WHILE THESE ARE ON OR IT WILL CAUSE DAMANGE. Flying without these are at the risk of the builder.
- Manage the rudder during take-off- the large propeller causes a lot of torque and P-factor.
- Raise the gear and trim once airborne. The model can fly at 1/2 - 3/4 throttle.
- On landings, extend the gear and gradually reduce the power- adjust as needed to allow the model to settle in a steady descent. Once the wheels touch cut the throttle to idle and keep straight with the rudder.