

Radio Control Scale Model



ZODIAC XL

Assembly Instructions

Scale: 1= 5.4
Wingspan: 59 3/8" (1508 mm)
Wing Area: 683 sq. in (4403 dm²)
Flying Weight: 6 – 6.5 lbs (2720 – 3000 g)
Wing Loading: 20 – 22 oz/ft²
Length: 47" (1193 mm)
Radio: 5 Channels with 7 servos
Engines: .46 – 60 cu in 2 Cycle
.50 – 72 cu in 4 Cycle



Warranty

Experimental Aircraft Models, LLC (EAM) guarantees this kit to be free from defects in material and workmanship. The warranty does not cover individual parts damaged by modification or abuse. In no case will EAM's responsibility or liability exceed the original purchase price of the kit. EAM reserves the right to change or modify this warranty at any time.

EAM assumes or accepts no liability for the manner in which this model aircraft is used by the user, in any condition of assembly. By the act of purchasing this kit, the purchaser and any subsequent user accepts full responsibility and all resulting liability.

If the purchaser is not willing to accept the above liability associated with the use of this model aircraft, the purchaser is advised to return this kit immediately to the source from where it was obtained.

Please read this manual thoroughly before starting assembly. It includes critical assembly instructions and warnings in regards to the safe and enjoyable use of this scale aircraft model.

About Your Model : You have purchased one of a limited production run Zodiac XL RC model kits in the world. You have a very unique model of an Experimental aircraft.

In the United States, 'Experimental Aircraft' are aircraft that are 51% or more built by an individual (usually at home) and fly under an FAA issued "Flight Permit", rather than "Certification". During the past 20 years the most advanced designs in civil aviation aircraft have come from the 'Homebuilt' arena where, without the burden of certification expense and manufacturers liability insurance, aircraft of amazing performance and safety could be designed and offered to the public.

In our mission to support the homebuilder with a scale model of an aircraft project that may have consumed hundreds/thousands of hours to complete, we have brought together full-scale aircraft kit airframe manufacturers with a state-of-the-art world class ARF (Almost Ready to Fly) model manufacturer. Our intent is to provide as scale a model as possible that is as ARF as possible - within the confines of limited production run sizes and knowledge that a builder will likely customize to match their own aircraft. In that sense, this product caters more to the full scale builders and scale modelers, than it does 'out of the box' flyers.

Some interesting details about the production of this model; We control the entire process of the model construction, starting with the direct import of balsa logs from Ecuador, to hand carving the fiberglass plugs and lay-up of the fiberglass components. The canopy molds are also hand carved and the vacuum forming is all done 'in-house'.

Just as the homebuilder customizes their personal aircraft, we have offered the model in pure white, so that you may do the same. At the end of the instruction manual we describe how to paint the covering, and provide a link to Top Flight's web site, which has excellent instructions.

Please note that we use aircraft terminology in our instructions. Specifically 'Port' is left and 'Starboard' is Right, and 'Forward' is to the front and Aft is to the rear. No matter how you may have the model turned Port is always the left side of the aircraft as the pilot sits in the cockpit facing forward. Thus if you are working on the model upside down with the tail facing towards you while installing servos, putting something on the Port side eliminates the confusion that 'left' side might result in.

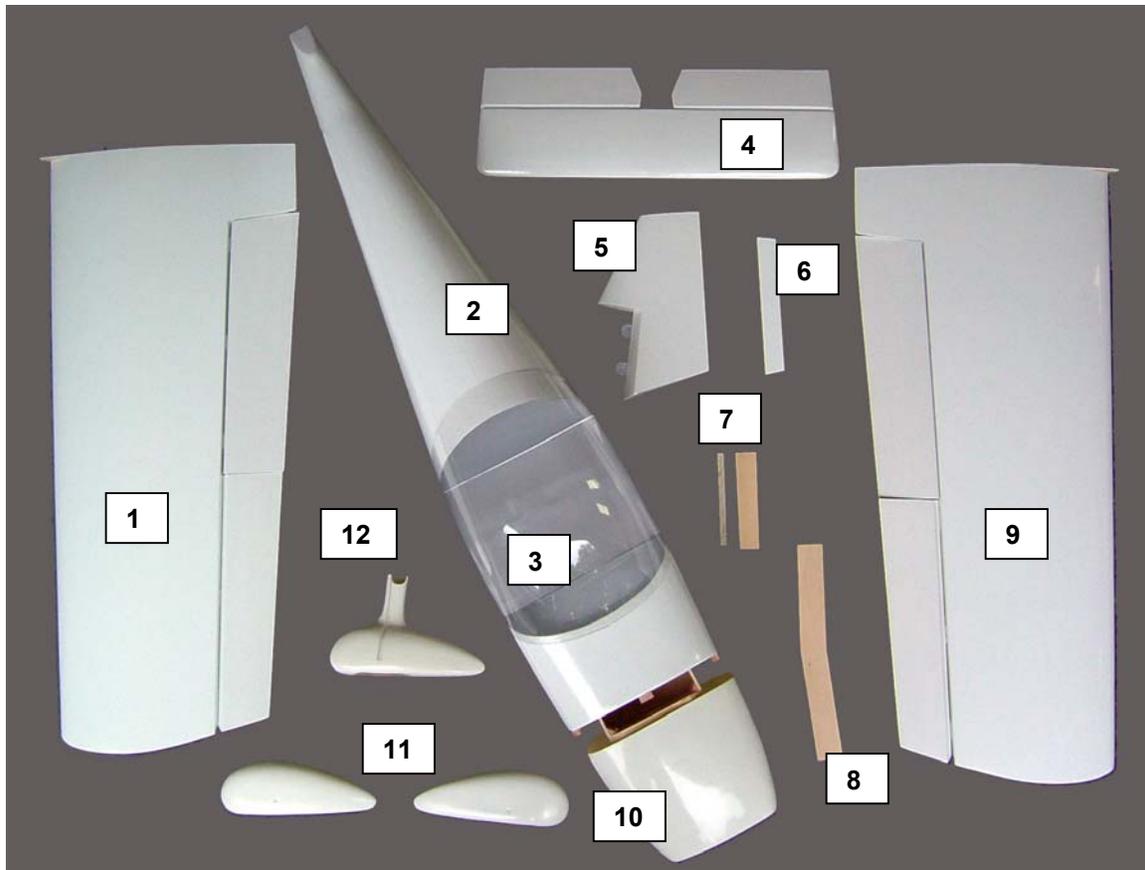
A final point: Because the model is so special and the volumes (by model standards) so low, we need your help. We have tried our absolute best to get everything right the first time. If there is something during the construction and flying of the model that you feel could be done more easily or better, we'd like to know. This is how it's done in the full size experimental aircraft world, and we want to be sure that the same spirit is carried on in smaller scale. Builders are continually finding ways to improve the full size aircraft, and there is no reason why modelers should not have the same ability to contribute to a better product.

Please feel free to e-mail us with kit comments at: info@RCHomebuilts.com We sincerely appreciate your vote of confidence in purchasing our rendition of Zenith Aircraft's Zodiac XL, and truly wish you the best of enjoyment.

Cleve L. Lee
Managing Director
Experimental Aircraft Models, LLC

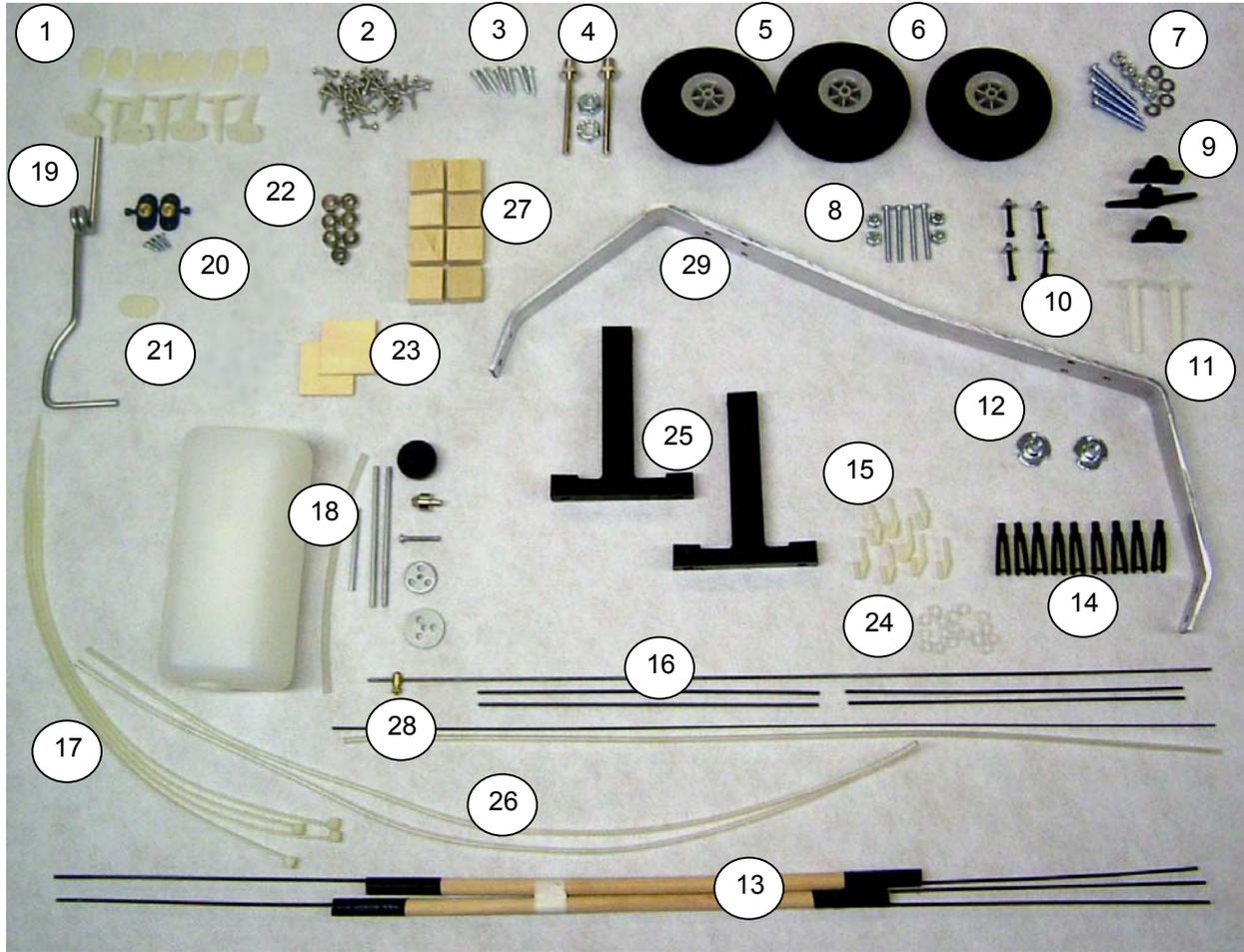
A note about the covering: Your Zodiac XL is covered in White 'Oracover' – commonly known as 'Ultracote' in the U.S. This is a high quality material, but through temperature changes during shipping, the model may show wrinkles. This is normal. The material can easily be tightened by the application of heat from a heat gun or hot iron. If using an iron, a piece of lightweight cotton (e.g. sheeting) placed between the iron and the covering helps to even the heating. Pressing lightly will transfer the heat to the covering, without bonding it to the wood, allowing it to shrink. If bubbles still occur, try a few pin holes in the covering to allow the trapped air to escape.

Airframe Components



Item	Description
1	Port Wing & Ailerons
2	Fuselage
3	Canopy
4	Stabilizer & Elevators
5	Rudder
6	Wing bolt protective strip
7	Motor mount box top & corner brace
8	Wing join spar
9	Starboard Wing & Ailerons
10	Fiberglass Cowling
11	Main gear wheel pants
12	Nose gear wheel pant w/fairing

Hardware



Qty.

Item	Description	Detail	Qty.
1	Control horns	(1) Rudder (2) Elevator (2) Ailerons (2) Flaps	7
2	Control horn screws Cowl mounting screws Canopy attach screws Wheel pant attachment Wing Servo Cover	(14) #2 x3/8" Washer Head sheet metal screw (5) (5) (10) (16)	50
3	Landing Gear attach screw	M4 x 15 Pan head sheet metal screw	6
4	Axle shafts w/Lock Nuts	Spring steel axle shafts 5/32 x 1 1/2" (4x40mm)	2
5	Main gear wheels	2.8" dia.	2
6	Nose wheel	2.7" dia	1
7	Engine Mount to Firewall bolts	8-32 x 1 1/4 pan head machine screw 8-32 Locknuts #8 flat washers	4 4 4
8	Motor to Mount bolts	6-32 x 1 1/4" pan head machine screw 6-32 Lock nuts (Nylon insert)	4 4
9	Nose gear mount	A) Nylon two piece 5/32 (4mm) i.d. pivot hole B) Pivot arm w/collar insert & 4-40 socket head screw	2 1
10	Nose gear mounting bolts	4-40 x 3/4" cap head machine screws 4-40 blind nut	4 4
11	Wing mounting bolts	1/4-20 x 1 1/2" Nylon	2
12	Wing mounting nuts	1/4-20 Blind "T" nuts	2

Item	Description	Detail	
13	Pushrods. Elevators and Rudder	Wood 11" (280 mm) (Shown Assembled Wire ends separate and packaged with (16) below)	2
14	Nylon Clevis Ends	(1) Rudder (2) Elevators (1) Throttle Servo (1) Steering Servo (2) Flaps (2) Ailerons	9
15	Nylon Quick Link	(1) Throttle arm (1) Steering arm (2) Ail (2) Flaps (1) Rudder (1) Elevator	8
16	Pushrod Wire	(4) .078 dia (2 mm) 6 ¾" (17 cm) – Ail. & Flaps (1) .047 dia (1.2 mm) 17" (43 cm) Throttle wire (1) 18" (46 cm) 2 mm steering wire (1) Nylon slip tube for 2 mm wire 17" (450mm)	
17	Tie wraps	12" tie wraps to secure radio and tank	4
18	Fuel Tank	380 CC	1
19	Wire nose gear	Spring steel – 5/32" (4 mm)	1
20	Main Gear Wheel Pants Retainers	Nylon keepers shown. Kit may have Sullivan metal brackets supplied in U.S. pack.	2
21	Wheel Pant Retainer	Flat Nylon keeper	5
22	Wheel Retaining Collars	5/32 ID. Collars, w/ 4-40 Cap Head screws	7
23	Extra wheel pant retaining ply		2
24	Silicon Clevis Retainers	Silicon bands	18
25	Engine mount	Glass reinforced Nylon	2
26	Nylon Guide Tube	2.7mm id. Guide tube to install rods 17"(450mm)	2
27	Servo mounting blocks	¾ x ¾ x 3/8" wood blocks	8
28	Throttle Servo Rod Connector	Brass or plated brass barrel w/set screw	1
29	Main gear	Formed Aluminum	1
30	Motor mount template	OS .40 & OS .60 (not shown)	1
31	Landing gear mounting template	(not shown)	1

Building the Wing

Sequence of events in this section:

- Installing Ailerons and Flap hinges
- Opening servo cover slots, wire and bolt holes in covering
- Threading servo wire extensions and installing servos
- Installing control arms, horns and pushrods
- Permanently assembling the wing halves
- Test fitting the wing
- Installing the Main landing gear (Tricycle version)

Additional components you may need from the hobby store:

- CA Adhesive (Thin)
- CA Adhesive (Medium)
- (2) 12" Servo wire extensions
- (2) "Y" Servo wire harnesses
- (4) Extended length servo arms to fit your brand of servo (optional)

Installing Ailerons and Flap Hinges

The control surfaces on the wings and stabilizers are not yet permanently attached. We have pre-cut and positioned the 'CA' hinges for you. In this step you will be 'removing' the flaps and aileron control surfaces from the wings, prepare them for gluing, and permanently re-installing them on the wings.

- 1) Pull the ailerons and flaps away from the wing.



- 2) Trim away the Oracover from around the hinge slots on both the wings and the control surfaces. Our favorite method is to use an old soldering iron with a blunted point on the end. This seals the Oracover to the wood at the same time as it melts back the covering from the slot. Otherwise a razor knife can be used to trim away the material. The objective is be sure the adhesive can wick into the slot. An edge of film sitting against the hinge may prevent the adhesive from flowing into the slot.



- 3) Drill a small (1/16" or 1.5mm) hole in the center of each slot to help 'wick' the adhesive onto the hinge in the next step.



- 4) Insert the CA hinges halfway into the slots on the control surfaces and place about 5 –6 drops of CA into the slot on both sides of the hinge material.
- 5) Position the control surfaces up to the wing, inserting the now bonded hinges into the slots in the wing. Position both the flap and the aileron in the desired position. Apply a few drops of CA to the

bottom of the flap hinges, and then (after a few seconds) rotate the flap downward and apply adhesive to the top of the hinge.

- 6) Finish the installation on the opposite wing.
- 7) Pull on the control surfaces to test their strength.

Opening wire, servo slots and bolt holes in covering

The Oracover must be removed in certain areas to allow mounting of the wing, clearance for servo pushrod operation and exiting of servo wires from the wing into the fuselage. We will also prepare the servo covers for mounting of the servos.

- 1) Referencing the picture, use either a sharp pointed razor knife or hot soldering



iron and open the two $\frac{1}{4}$ " (6mm) wing mounting bolt holes (top and bottom) and the two $\frac{1}{2}$ " wire exit hole located on the top of the wing. (The servo wires enter into the cabin space from the top side of the wing.) If using the razor knife, you'll get better results if you cut on the downward stroke – pushing the covering against the underlying wood for support as you cut.

- 2) Locate the servo bay covers on the bottom of each wing. Remove one at a time, mark the bottom side of the cover and inside the servo bay with a letter or number to maintain their relationship.

- a. *For future reference, note that the slots for the aileron servos are 'outboard' from the plane's center line, and therefore are left and right (opposite) to each other. However, the flap servo covers both have the slots to the same side of the servo cover centerline. This is because the ailerons operate in opposite directions, and the flaps both operate in the same direction.*



- 3) Trim the slot opening of each servo cover with a sharp razor knife. (Don't use the soldering iron trick, as it will show the melted edge where it would be visible from the bottom side of the plane.)

- 4) With the covers in place, drill a $\frac{1}{16}$ " (1.5mm) hole at each corner. Install #2 x $\frac{3}{8}$ " washer head screws, then remove and place a few drops of thin CA into the holes to strengthen the threads.

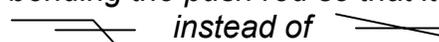
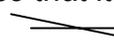


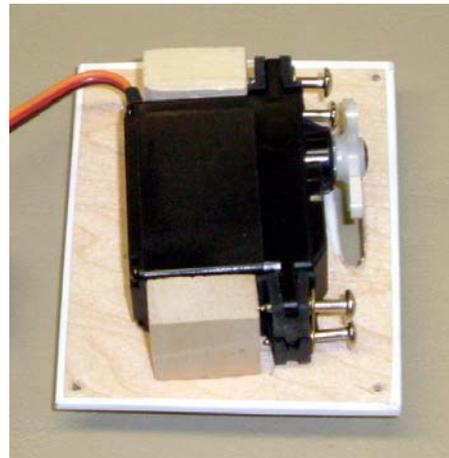
Threading Servo Wire Extensions and Installing Servos

For ease of serviceability we secure the servos directly to the underside of the servo covers, mounting them to wood blocks. Verify that the servo arms are electrically neutral and you are using the length of arm you intend to use. (Refer to your Radio owners manual for techniques for centering the servo arm.)

- 1) Install the rubber pads and eyelets into the servo mounting lugs (supplied by servo mfg.)
- 2) Position a servo on the back side of a servo cover, with the arm projecting at 90 degrees through the slot, and the face of the arm parallel to the slot.
- 3) Test fit two wood blocks (supplied with this kit) under the servo mounting lugs. Double check position of the servo arm in the slot, and allow room for compression of the rubber pads, if necessary, when the mounting screws are tightened.
- 4) Bond the wood blocks to the servo cover using at least a medium thickness CA adhesive, or epoxy.
- 5) Test fit the cover with the blocks into the wing. In some cases the cover support in the wing may need to be cut away in the area of the block.

- 6) Before installing the servo, replace (if necessary) the output arm with an arm long enough to allow clearance of the pushrod when operated to extreme positions.

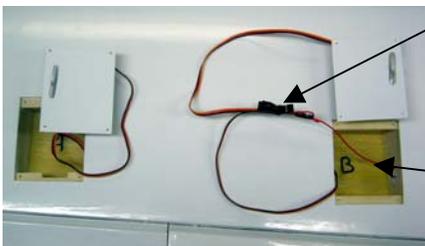
Alternatively, if you are unable to locate longer servo output arms, later, you can widen the slot to allow room for the rod keeper, which would otherwise interfere with the top side of the cover. This approach may require bending the push rod so that it enters the slot slightly more vertically - Like this  instead of 



- 7) Repeat the above process for all four wing servos. Again, note how the Flap servos both face in the same direction, while the aileron servos lay in opposite directions.
- 8) Plug a 12" servo cable extension on to both of the Aileron servo cables. Use a piece of heat shrink tubing or electrical tape to keep the connection secure.
- 9) Using the pre-installed monofilament pull string, draw the aileron servo cables through the wing **just up to the flap servo bay**.

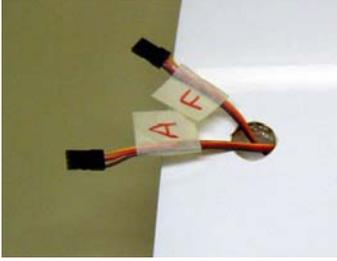
- a. If the cord is missing or has been pulled through by accident, the plastic pushrod guide tubes or metal pushrods in the kit make great 'snakes'. Insert into the routing hole, push through to the servo bay and attach the servo cable to the wire/tube using electrical tape.

- 10) Secure the end of the flap servo cable behind the aileron connector (so they both fit through the hole) temporarily with tape, and pull the 'train' through to the root rib of the wing. Remove pull string.



Pull String (shown as red and enlarged)

- 11) Pull the servo wires out through the hole in the top of the wing. Separate the aileron and flap servo wires, and clearly label each for later connection to the receiver.

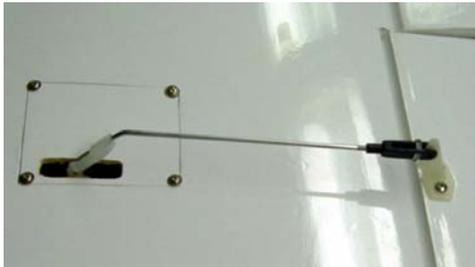


wing remained tight.

- 12) Repeat the servo installation process for the other wing.
- 13) Plug the servos into the receiver and test their operation to be sure wire connections inside the

Installing control arms, horns and pushrods

Now that the servos are installed and respond to the radio, it's time to make them move the control surfaces. Nylon control horns will be fastened to the ailerons and flaps, and pre-sized wire pushrods will be bent and cut to final length. Nylon clevises will then be threaded on to the ends of the pushrods and connected to the control horns.



- 1) Plug an aileron servo into the receiver and turn the transmitter 'on' and set the trim to center.
- 2) With the servo cover in place, but not screwed down, double check that the servo arm exits the slot perpendicular to the cover.
- 3) Position a nylon control horn on the aileron so that it is offset to one side and lines up with one side of the servo arm, not the centerline. Secure the control horn to the aileron with #2 x 3/8" screws. There are plywood hard points in the aileron into which you can screw directly. (If you prefer you can use the nylon backing plates, which will require longer screws.)
- 4) Retrieve a 6 3/4" (170mm) pushrod, & thread a black rod clevis at least 20 half turns, and slip a silicon clevis retainer on to the assembly.
- 5) Temporarily attach the clevis to the control horn in a middle hole, and determine whether your servo arm is long enough to have a straight pushrod, or if the pushrod will require a bend to facilitate full travel of the servo arm without hitting the ends of the slot in the cover. (Seen note in step 6 above)
- 6) Bend the arm as required so that it will align with a hole on the servo arm (when centered), and then place the rod so that it passes over the desired hole in the servo arm. Mark the location of the hole on the wire and subtract 1/16" (1.5mm) for a bend allowance. Carefully bend a right angle, in the direction opposite the offset of the control horn, so that it can enter the servo arm.

- 7) Cut off and deburr the end of the wire so that the right angle short leg measures at least 3/16" from the inside of the bend. The servo arm may require drilling of the hole to accept the pushrod wire diameter.
- 8) Secure the pushrod to the servo using a nylon Quick Link.

Permanently Assemble the Wing Halves

The two wing halves are joined using the plywood wing joiner and 30 minute epoxy. A reinforcing doubler is added to strengthen the area directly beneath the head of the wing bolts.

- 1) Retrieve the Wing Joiner – this piece strengthens the joint between the wings and helps to set the wing dihedral.
- 2) Test fit the Joiner into both wing halves and slide the wings together to be sure both root ribs meet at the center. Mark the center of the Joiner as a reference mark. Sand as necessary to get a smooth close fit.
- 3) Separate the wings and using a scrap piece of wood, Popsicle stick or tongue depressor, apply 30 minute epoxy to the inside of the Joiner box on both wings and one end of the Joiner. Slip the joiner into the wing.
- 4) Coat the root ribs on both wings and the remaining portion of the Joiner, and slip the wings together.
- 5) Wipe away the excess epoxy (Isopropyl alcohol does a good job) and clamp and tape the leading and trailing edges together to prevent twisting while drying. A small clamp on the leading edge root rib tabs is also helpful. (Consider protecting the clamp with cello packing tape.)

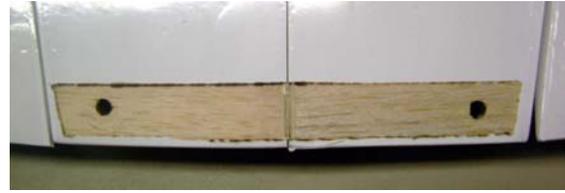


approximately 4 3/4" (120mm) at the wing tip corner, where the aileron meets the tip.

- 6) Check the dihedral. With the opposite wing flat on the table, it should be



- 7) Set aside to dry in a location away from the dog and cat and some place flat so that you will not induce a twist.
- 8) After the glue is cured, retrieve the wing bolt protective strip (a narrow plywood strip covered on one side) and trial position the piece at the center section of the wing trailing edge. Note the location and trim away the Oracover so that the doubler overlaps the Oracover by 1/8" (3mm). (This area will be visible so we don't want uncovered balsa showing around the edges of the doubler.)



- 9) Epoxy the doubler in place, and clamp. Clamps with rubber ends prevent slipping off the tapered surface. Be careful not to use too much pressure as it may dent the top surface. (Even though the top surface will not be visible in the assembled model.)
- 10) After glue has dried, through drill $9/32$ " (7mm) the protective strip from the opposite side, using the wing mounting holes as a guide. Drill against a wood surface to minimize tearing of the covering.

Test Mount Wing to Fuselage

- 1) Locate the two $1/4$ -20 Blind nuts in the U.S. pack. With the fuselage upside down, place them beneath the fuselage trailing edge mounting holes, "T" side up, and pull them into place using the full thread $1/4$ -20 UNC bolt, washer and wedge supplied in the U.S. Pack.
- 2) Mount the wing by inserting the tabs at the leading edge of the wing into the slot on the bulkhead where the leading edge fits, and lower the trailing edge against the fuselage.
- 3) Insert two $1/4$ - 20 Nylon Finger Wing Mounting Bolts through the wing holes and open as appropriate to allow easy insertion of the bolts. Nylon bolts are easy to cross thread, so only use finger pressure. You may cut the bolts to a desired length after testing their fit. (Best way to do this is to thread a $1/4$ -20 nut onto the threads before cutting so that the removal of the nut cleans up the threads.)
- 4) Remove the wing for the next steps.



Installing the Tricycle Main Gear

- 1) Retrieve the aluminum landing gear and mark the centerline between the two legs. The gear will be fitting against the bottom of the wing, and as such has a slight bend in the middle to match the wing dihedral.
- 2) In the U.S. pack we have supplied a set of DuBro $5/32$ " axles, improving upon most manufacturers use of threaded bolts as axles. Two minor modifications are required to enable using them:
 - a. Cut them to length. Cut off approximately $3/8$ " (9.5 mm) so that the axle portion measures $1\ 1/2$ " to $1\ 5/8$ " (38 – 41mm) from the face of the hex flange.



- b. Enlarge the main gear bolt holes (those closest to the ends of the aluminum gear). Using the existing hole as a pilot hole, drill them out to 5/16". This will allow insertion of the threaded portion of the axle into the landing gear.
 - c. Install the axles onto the main gear and secure with the supplied locknuts.
- 3) Retrieve the six (6) M4 x15 Pan Head Screws (#3) from the hardware pack.



- 4) Position the gear on the bottom of the wing so that the front edge is 5 1/4" (133mm) from the leading edge of the wing. Make certain the gear is parallel to the leading edge.
- 5) Using the holes in the landing gear as a template, drill a 3/32" (2mm) hole. Insert an M4 x 15 pan head screw (#3) Drill a second hole on the opposite side to ensure correct positioning and insert a second screw. Now you can finish the installation of the remaining four holes.

Engine & Nose Gear Installation

Sequence of events in this section:

- Initial Cowl fitting
- Install the steerable nose gear
- Positioning and installing the engine
- Assembling and installing the fuel tank and fuel lines

Additional components you may need from the hobby store:

"Pitts" style muffler or muffler extension for two cycle motors

Initial Cowl fit

As it is easier to handle the fuselage without the weight of the engine and without the tail surfaces on, we'll position and locate the cowl mounting screws at this point in time.

1. To help locate the cowl mounting blocks after they are hidden by the cowl, use a felt tip marker and place a dot on the Oracover opposite the center of the cowl mounting blocks. (Acetone will remove the marker without hurting the Oracover.)



2. Retrieve the cowl and slip it over the 5 cowl mounting blocks. Position the top center of the cowl along the edge of the foredeck, and with the edge fitting over the recess and flush with the foredeck, apply a piece of tape to hold in place. (Don't cover the dot!)

3. Fit the rest of the edges around the circumference of the cowl. If the cowl is too tight, trim away the covering and possibly some of the plywood lip in the corners.
4. When comfortable with the fit, drill a 1/16 (1.6mm) hole opposite each dot, 1/4" (6mm) away from the edge of the cowl. Go all the way through the cowl block.
5. Install a #2 x3/8" washer head screw in each hole, and then remove. Remove the cowl. Reinforce the threads in the wood by adding a drop or two of thin CA.
6. Now is a good time to clean-up the openings in the cowl. A flexible shaft tool (e.g. Dremel™) with a small milling bit works great for the lower air inlet. We expect you will be painting the cowl. (We like Top Flight's Lusterkote or Nelson Hobbies 'Hobby Paint,' which is a water based epoxy system. Hangar 9 also offers a white paint designed to match the white in the covering.) This is a good time to wet sand with 320-400 grit sand paper in soapy water to prepare the cowling for painting. (It seems hard to believe, but soap and water removes the mold release better than solvents.) Since your hands are already wet, you might want to do the wheel fairings while you are at it. You will be handling the cowl again later, so don't be too concerned about final painting prep at this point.

Installing the steerable nose gear

- 1) Retrieve the wire nose gear (19) and items (9) & (10) steering bracket, steering arm and mounting hardware.

- 2) Locate the centerline of the fuselage and place a mark at this point along the bottom edge on the bulkhead. This is below the engine mounting box. (Model is upside down in this picture)



- 3) Slide a bracket, then the steering arm followed by another bracket on to the nose gear wire and use the steering bracket hardware as templates to drill the (4) mounting holes using a 7/64" (2.8mm) drill. The nose gear wire will maintain alignment and allow you to be sure that the gear is vertical and can pivot easily.



- 4) Secure the brackets to the bulkhead using the blind nuts and screws (#10) in the hardware pack. Use a drop of 'Loctite' or nail polish in the bolt threads to keep them from

loosening.

- 5) Mark the location for the steering pushrod hole directly behind the outermost hole on the steering arm on the port side of the model. Drill a 5/32" (4 mm) hole.

- 6) Slip the nose gear and steering arm out of the brackets and set aside for a few minutes. It's easier to work on the engine mount, next, without the gear in the way. (. . and it was easier to put the bracket on now than with the engine in the way . .)

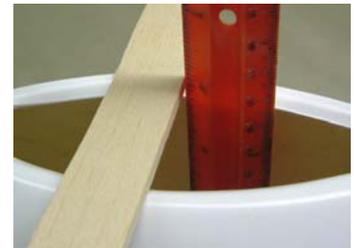
Positioning and Installing the Engine

The objective of this section is to place the engine on the firewall so that the back of the spinner clears the front of the cowl by 1/16" (1.5mm), and the spinner is centered on the cowl. Our instructions will work for all brands of engines.

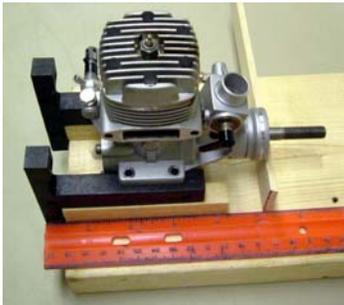
Positioning the engine fore/aft (front to back) on the motor mount

- 1) Place the cowl on the model and secure with a few screws.

- 2) Measure from the firewall to the front edge of the cowl through the center opening. Lay a flat edge across the opening to be sure you are reading the correct distance. It is approximately 4 7/8" (123.8 mm) The firewall has a 2 degree offset built in, so measuring from the center is important.



- 3) Place the motor mounts on a work bench or piece of wood so that the short legs overhang, and raise the mounts enough so that when the motor sits on the rails, it will not bottom out on the bench.



- 4) Make sure the rails are square with the bench or wood, and the legs are touching the facing surface where they overhang. Place the engine squarely between the rails and position it so that the distance from the rear of the rails to the front face of the thrust washer is the same as you measured in step 2 above, and then move the motor forward 3/64" (1.0 mm). You are better to err moving forward too much, than too little.

- 5) Mark the engine hole locations (we like using a 'Transfer Punch') and drill straight through. Secure the engine with four bolts and washers & locknuts on the bottom. (Item #8)

Positioning the Engine Assembly on the Firewall and Preparing for Fuel Tank Installation

We like the direct method of positioning the engine/mounts, as opposed to measuring. That is, we'll put the engine/mounts assembly under the cowl, position it and mark the location. (This is easier with a second set of hands.) First test that the back plate for the Aluminum spinner (supplied in the U.S. Pack) slips over the prop shaft - be sure it's a close fit, and easily removed. (A bushing is packed with the spinner nut.) Then read '1 through 10' below before starting.

- 1) Remove the cowl and stand the model on its tail (preferably on a pad.)

2) Place the engine/mount assembly on the firewall so that the cylinder exhaust faces the bottom of the aircraft (i.e. laying 'sideways') and the prop shaft is somewhat centered.

3) Place the cowl over the engine and ensure correct position with at least two screws.

4) Move the engine by the prop shaft so that the spinner back plate is centered on the cowling and the cylinder is either horizontal or clears the inside of the cowl.



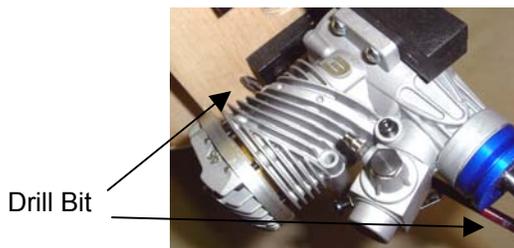
5) Using a pencil through the cowl air inlet, while pressing down on the shaft to prevent the engine from moving, mark the accessible corners of both the upper and lower engine mounts against the plywood.

6) This is also a good time to verify the spinner back plate clearance with the cowl.

7) Remove the cowling, reposition the engine/mount and mark the engine mount holes. Then drill small pilot holes through the firewall, followed with a 3/16" (4.5mm) drill in the 4 places.

8) Test the engine location by inserting (4) 8-32 bolts (supplied) through the engine mounts and refit the cowl and spinner back plate.

9) This is a good time to locate and drill a 5/32" (4 mm) passage hole for the throttle pushrod. For most two cycle engines, a good place to put the hole is to starboard of the lower engine mount leg. This will clear the fuel tank to be installed shortly. The exact location will depend upon your choice of engine. You can see in the picture where we lined up the hole with the carburetor throttle arm (hidden) using a long drill.

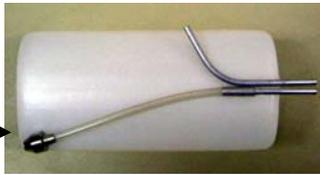


10) The engine compartment plywood is factory fuel proofed, however check that coverage is complete and if appropriate, apply a coat of sealing epoxy to all exposed wood (thinned with alcohol so that it can be brushed) and allow to dry.

11) Secure the motor mount in place with washers and locknuts (Supplied). Note that lower starboard bolt may need to be cut 3/16" (5mm) to allow the fuel tank neck to fit into the center hole, which is installed in the next series of steps You may want to leave the nut off this bolt until you test fit the fuel tank.

Installing the fuel tank

Make sure clunk does not hit end of fuel tank inside.



to create the vent line. The short fuel pickup piece enters straight in. Replace the fuel line supplied with the tank, with a piece of the fuel line supplied with the U.S. Pack. (It's better quality.) Use the holes in the black plug that go all the way through. Mark the large outside metal disk with (F)uel and (V) so you know which tube is which. Do not tighten the plug screw yet.



- 1) Referencing the picture, assemble the fuel tank so that a round side becomes the bottom, and the tank hole is towards the round top side. You will need to gently bend one long piece of tubing to reach up to the inside top of the tank
- If your kit was supplied with the optional DuBro 'Fill-it Fueling System' in the U.S. Pack, you will use the DuBro third piece of tubing to enable remote refueling. Follow the installation directions on DuBro's package to install the filler, using the third hole in the plug. If you do not use the fueling system, you will not use the other long piece of aluminum tubing packed with the fuel tank. The installation will likely require an additional hole in the cowl bulkhead to route a filler line back to the remote filler mounted against the inside of the fuselage.
- 2) Making sure that the vent tube is pointing to the top of the tank and the clunk does not hit on the inside back end of the tank, install the plug assembly into the tank and tighten the plug screw until it is snug and the plug is firmly held in place. The plug expands between the two metal disks to create the seal. The rubber plug fits tightly, even before the screw is tightened and a flat blade screwdriver (used carefully) around the edge helps to get it in the hole.
- 3) Insert the tank into the aircraft so that the tank plug fits into the firewall hole, and the round top is up, you may see the lower engine mount bolt (the one without the nut) slide outward as the tank pushes against it if you have not already cut the bolt.
- 4) Cut a small piece of foam (not supplied) approximately 2 1/2" x 3" (64 x 76 mm) which will be placed between the tank and tank support to cradle the curve and resist movement.
- 5) Retrieve the plywood tank support from the U.S. Pack and start a tie-wrap through two opposing slots in the support. (Insert the tail into the ratchet to just past the first notch. Do not tighten.) We are making an oversize loop that will go around the tank. Slide the tank support, tie-wrap to the aft end, into the fuselage under the tank between the vertical plywood engine bearers, with the foam piece between the tank and the support.

- 6) Pull the tie-wrap tight with needle nose pliers.
- 7) Be sure that the neck of the tank exits through the hole provided in the firewall and level the assembly so that it is parallel with the fuselage. Using epoxy or Thin CA, bond the support in place. There is a long glue line between the parts, but if you feel more comfortable reinforcing the joint between the tank mount and side walls, a wedge of balsa can be glued into the corner joint.
- 8) Install the remaining engine mount nut.



Stabilizer and Rudder Installation

Sequence of events in this section:

- Fitting and bonding the stabilizer into place
- Hinging the Elevators and Rudder
- Attaching control horns to the Elevators and Rudder

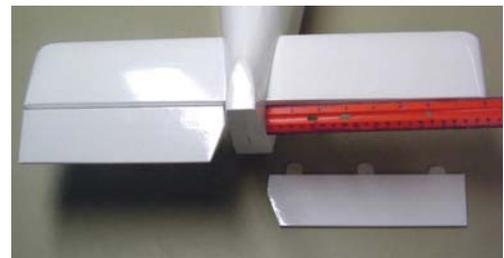
Additional components you may need from the hobby store:

None

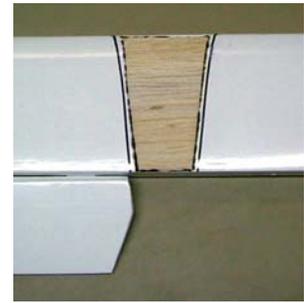
Fitting and bonding the Stabilizer into place

In this section the stabilizer is positioned and marked for removal of the Oracover in the area that will have epoxy applied. The stabilizer is then bonded in place while ensuring that it is centered and square.

- 1) Install the wing (you will use this to make sure the stabilizer is parallel.) Retrieve the stabilizer, pulling the elevators off the unglued hinges – & mark the parts so you know which side was which and which side was up!
- 2) Slide the stabilizer into the hole in the fuselage and center it by measuring equal distances along the trailing edge from the side of the fuselage to a convenient 'corner'.
- 3) Set the stabilizer square with the fuselage by measuring from the trailing edge of the wing (not from a control surface) on both sides and setting it equal.
- 4) With a felt tip pen or the back side of a knife to create a shallow indent, mark the stabilizer along the edge of the fuselage on both the top and bottom.



5) Remove the stabilizer and with the soldering iron or razor knife, scribe a trim line 1/8" (3mm) inside the lines, and across to each other to create a trapezoid. Do this on the top and bottom of the stabilizer. Remove the isolated trim.



6) Using Acetone, MEK or Alcohol, clean away the pen lines that may be left on the fuselage and stabilizer. (Wear appropriate protective garments when using these chemicals).

7) Using 30 minute epoxy applied to the top and bottom of the stabilizer, slide the stabilizer into place. Slide the stab slightly past the desired point, and then return, to be sure adhesive is spread across the entire surface.

8) Wipe away excessive epoxy, and clean the area with Isopropyl Alcohol.

9) Verify correct position and check to confirm square by measuring again, and set aside to dry.

Hinging the Elevators and Rudder

In these steps we repeat the process we used to attach the ailerons and flaps.

1) Remove the elevators from the stabilizer if not already done, and retrieve the rudder (Packed separately.)

2) Pull out the CA hinges and trim away the Oracover from around the slot in the elevators, rudder, vertical stabilizer and stabilizer.

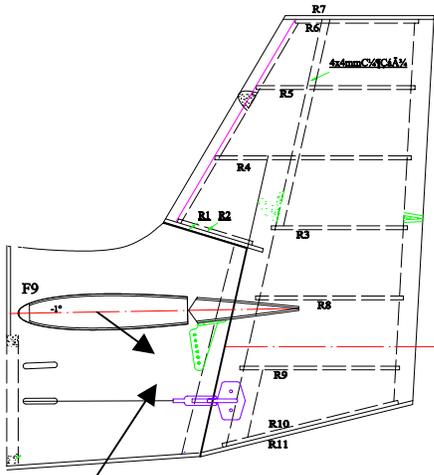
3) Drill a 1/16 (1.6mm) hole in the center of each slit to help wick the CA into the slot.

4) Test fit the parts to be sure gaps between surfaces are proper and that the CA hinges fit properly. After fitting, consider marking the position of the hinge in the control surface (left to right) as you remove it. Then when you put it back in, ensure that it is half way in, apply 4 drops of Thin CA adhesive to both sides of the each hinge.

5) Insert the control surface back into its location and apply the CA adhesive to both sides of the hinges on the control surfaces

Servo and Pushrod Installation

In this section we will attach the rudder and elevators control horns, mount the servos, and install the pushrods that operate the aft control surfaces and ground steering. We will also install the throttle servo and discuss the routing of the throttle pushrod wire.

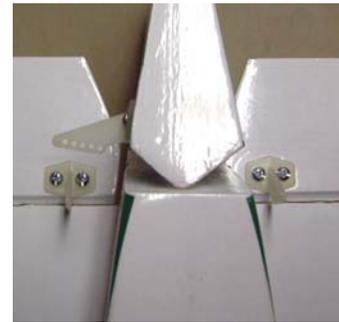


At left is a section of the model drawing showing the intended location for mounting the rudder horn. Also shown is the location of the slots in the fuselage side for both the elevator and rudder pushrod exits.

- 1) As you will install the rudder horn on the Port side of the aircraft, locate and cut away the covering from both pushrod slots under the leading edge of the stabilizer, and only the upper elevator slot on the Starboard side of the aircraft.

- 2) Retrieve three control horns (#1) for the elevators and rudder. Drill out the mounting holes to 1/8" (3mm) to allow the No.4 x 3/4" (U.S. Pack) screw to slip through.

- 3) Position the elevator horns as shown in the picture and so they line up with the pushrod exits. Attach each with (2) No.4 x 3/4" Pan Hd sheet metal screws and backing plates. Use caution to not over tighten (as observed by compression of the covering under the backing plate.) After both elevators have the horns mounted, grind off the points on the top side of the elevators.



- 4) The rudder horn will sit atop a built up area inside the rudder and will not use a backing plate.
 - i. Position the rudder horn, mark and drill two 1/16" (1.5mm) mounting holes. Insert a No.4 x 3/4" screw (#1) into each hole, remove and harden the hole with a few drops of thin CA.
 - ii. Install the rudder horn with (2) #4 x 3/4" Pan Hd sheet metal screws.

Elevator Pushrod Installation

- 5) Retrieve the 11" wood dowel pushrod that has two slots on one end and one slot on the other. There are five 'medium length' pushrod wires between 7" & 8". Pick out a 7 1/2", 7 1/4" and 7" wire. Each of these wires will be straight on one end and threaded on the other. The following steps will secure the wires to the dowel by bending a 90 degree leg and bonding the wires into their slots and reinforced with heat shrink tubing. Two staggered holes are provided at one end of the dowel. The two longest wires are different lengths so that the bent legs inserted into the dowel in the different holes end up with about the same finished length.)

- a. Cut 1 1/4" off the unthreaded ends of the 7 1/2" and 7 1/4" wires. These wires should be 6 1/4" and 6" respectively.

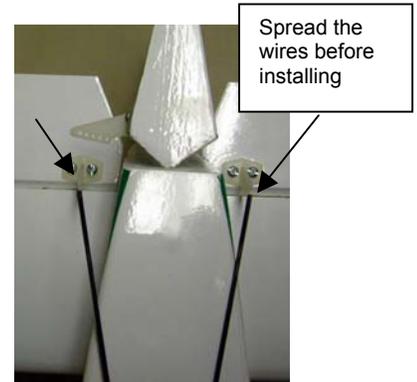


Same finished length

- b. Bend a ¼" 90 degree leg in the non-threaded end of each pushrod wire.
- c. Slide a piece of heat shrink tubing over the ends of the dowel.
- d. On the end with two slots, insert the bent leg of the 6 ¼" wire into the hole furthest from the end and prepare to epoxy the wire into the hole and slot.
- e. Insert the bent leg of the 6" wire into the opposite hole/slot and epoxy both wires in place.
- f. Slide the heat shrink tubing to be flush with the end of the dowel and apply heat to firmly hold the assembly in place while the glue cures.
- g. Repeat the process for the remaining 6" wire length in the other end of the pushrod.

6) While the elevator pushrod is drying, build the Rudder pushrod in the same manner, installing a 7" wire on both ends.

7) After the elevator pushrod is dry, lay the fuselage upside down on the work-bench. Spread the 'Y' legs so that they line up with the elevator horns when placed against the bottom of the fuselage when viewed from above.



8) Retrieve the two plastic pushrod tubes (#26) supplied with the kit. We will use these to assist with helping to insert the 'Y' end of the rod into the fuselage so that they exit through the elevator push rod slots. These tubes are simply tools to help with this step.

- a. Insert the plastic tubes from the outside of the fuselage through the elevator pushrods slots.
- b. From the cockpit area, looking aft, on the Starboard side where there is a notch in the frame, insert one leg of the pushrod into each tube, and then slide the pushrod and tubes rearward until the rods exit from the slots.



9) We are going to make a shallow 'Z' bend in the rod. The purpose is to convert the 'Y' so that it pushes parallel to the aircraft centerline, and have the clevis connect with the control horn squarely. (see pictures and read below)

- a. Push the push rod firmly into the model, forcing the rod ends to move to about ½" (12mm) past the hinge line of the elevator so as to give room to hold the rod with a pair of needle nose pliers next to the slot.
- b. Make a bend in both rods to point the leg outward. (approx 45 degree bend.)
- c. Slide the pushrod back in to where the exiting legs are in the middle of the slot. And make sure the pushrod in the cockpit is in the notch near the centerline of the model. Make a corresponding bend in the exiting legs to align with the location of the elevator horns.



- d. Locate two black nylon clevises and silicon keepers. Slide the keeper over the exiting rod on each side, and then thread at least 20 half-turns the clevises to the end of the rods. Connect the clevis to a middle hole in the horn.
- e. Move the pushrod forward and backwards to be sure the elevators move freely. Bend the pushrods at the exit equally as necessary to operate freely and equally. The clevises should go straight into the control horns and should not bend where the horn pivots with the clevis.



10) To mount the elevator servo, center the pushrod in the cockpit so that it is near the center of the fuselage. (You can see that if you move it side to side you will affect the

relationship between the two elevators. Keeping it centered will minimize dissimilar movement when the servo moves the rod.). Position the servo slightly to one side so that the servo arm hole is on center with the rod, and secure using the screws provided by the radio manufacturer.

By cutting the wire rods in step 5a above, you will eliminate this close fit of the pushrod with the bulkhead opening. The end of the dowel will be further aft and the wire will pass through with much more clearance.



11) Turn your transmitter on and plug the servo into the receiver. Position the servo arm so that at idle position the servo arm is at right angles to the elevator pushrod. Cut off the other servo arms as necessary to prevent interference with the pushrod action at extreme travel. Turn the radio off, transmitter last.

12) Hold the pushrod next to the servo arm and bend a right angle in the rod at the desired location at right angles to the face of the servo arm (allowing 1/16" (1.5mm) bend allowance). You can either complete a 'Z' bend, or leave it at a right angle and cut the wire off with a minimum 3/16 (5mm) inside leg, and use a Quick Link to secure the pushrod in the servo arm. Note that you will likely have to drill the hole larger in your servo arm to accept the push rod. This is normal.

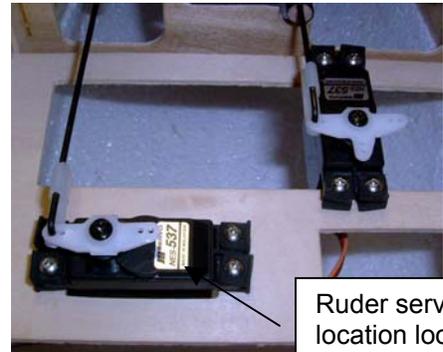


13) Double-check the position of the elevators. Adjust the clevises as necessary to align them with the stabilizer and each other.

Rudder Pushrod Installation

- 14) Using the same 'tube technique' as above feed the rudder pushrod, threaded end first, along the port side of the fuselage so that it exits the lower slot on the port side.
- 15) Locate a nylon clevis and silicone keeper ring. Slide the keeper over the exiting rod and thread the clevis at least 20 half-turns. Connect the clevis to the outermost hole in the rudder horn. (The full flying rudder is very powerful and minimal travel is needed for initial flights.)
- 16) Test operate the rudder pushrod by hand from inside the model. It should work smoothly as you hold the rod over the servo opening on the port side.
- 17) Looking at the fuselage upside down through the wing opening, position the rudder servo in the forward port side opening. Secure the servo with the screws supplied by the radio manufacturer.

- 18) Electrically position the servo arm at 90 degrees to the pushrod with your radio, trim centered, and size/bend the rudder pushrod length as you did with the elevator pushrod. (You may have to remove the control arm from the servo and set it back down on the splines in a different position.) Connect the push rod using a Z bend or with a Quick Link.



Nose Wheel Steering Installation

- 19) Nose wheel steering is operated by a .070" (1.8mm) dia. pushrod wire. It routes in a straight line from the inboard side of the rudder servo arm, to the nose wheel steering arm, through the hole previously drilled in the firewall.

- a. Retrieve the .070 dia (1.8mm) steering pushrod wire. This is a single length long enough to fit between the rudder servo and the steering arm. With needle nose pliers, make a 'Z' bend at one end to fit the steering arm. Remove the steering arm from the nose gear and insert the 'Z' end into the arm from the correct side so that it will realign with the hole in the firewall that you drilled. (You will need to drill the hole larger in the steering arm for the wire to fit.) From the front side of the firewall, insert the straight end of the pushrod into the hole and re-assemble the arm to the nose gear. (Do not tighten the steering arm setscrew. Later you will be disassembling to fit the cowl and adjust the height.)



- b. Inside the fuselage make an elongated Z bend to 'lower' the rod so that it does not touch the wing when mounted (you can sight from the side of the fuselage across the wing saddles to be sure the wire is below. This bend is also be used to fine tune the length of the steering wire to ensure the aircraft tracks straight on the ground.



- c. Electrically center the servo/rudder with the radio and manually square the nose gear/steering arm at the firewall, ensuring the nose wheel is pointed forward.
- d. Size and bend a right angle at the servo arm and attach with a Quick Link or Z bend. Again, you will likely need to drill a larger the hole in the servo arm.
- e. Operate the rudder servo with the radio and verify that the rudder and nose wheel move freely and in the correct direction when the stick is moved. If necessary adjust/bend the V Bend to point the nose wheel straight. (Make sure the trim is centered!)

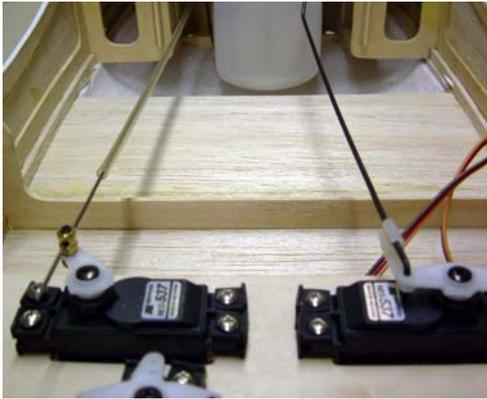
Throttle Pushrod Installation

The throttle is operated by a .050" (1.3mm) dia. pushrod wire, which slides inside a nylon tube/housing. Installation will vary, particularly if you are installing a 4 cycle engine. *If you did not drill the throttle wire passage hole earlier, remember that the fuel tank is now behind the firewall – so drill carefully!*

- 20) Retrieve the pushrod wire and nylon tubing and bend a 'Z' bend on one end of the wire to fit the engine throttle arm. You will likely have to remove the engine or carburetor arm to install the Z bend into the arm.
- 21) Slide the nylon housing over the throttle wire and insert the straight end of the wire and housing into the hole in the firewall. Position the housing so that it does not interfere at either end with the throttle or servo control arms.
- 22) Retrieve your servo throttle and remove the servo arm. Retrieve and assemble the Throttle Rod Connector (31) to the servo arm. Be sure to use a washer on the bottom side of the servo arm and secure with Loctite or similar thread locker. Set aside. (This part rotates as the arm moves, so the nut must be protected from loosening.)
- 23) Mount the throttle servo, and with the radio on, move the throttle stick to full throttle and turn off the radio, transmitter last. *(Be sure to verify direction of travel required for your engine throttle operation and reverse the servo operation as necessary with your transmitter settings.)*



24) Slide the connector/servo arm over the throttle wire and position the servo arm on the servo output shaft/splines so that full travel will close the throttle.



Remember to re-install the servo arm screw in the center! (In fact check all your servo arms right now.) Snug the Allen screw in the throttle rod connector, securing the wire pushrod. Test the entire installation to be sure the throttle moves full travel and full down trim closes the throttle entirely. If you must err in one direction, slight over-travel when pushing the rod will

spring the rod slightly, which is more acceptable than straining on the rod when pulling. If you have a computer radio the better way is to set the control throw exactly.

25) Bond the nylon housing tube to the firewall with epoxy so that it will stay where originally positioned. Consider installing an intermediate brace for the tube. (e.g. bond tube to ply bulkhead near the rear of the fuselage tank.) Allow the end near the servo to move with the servo arm.

26) If you have not done so already, connect the fuel line to your engine carburetor.

Completing the Radio Installation

In this section we secure the receiver, install the switch/charging harness, and run the antenna.

- 1) You will need two “Y” connectors for your receiver; One to operate the flaps, and the other to operate the ailerons. (Previously identified in “Building the Wing” section)
 - a. Plug-in all connectors and secure to the receiver
 - i. Aileron Y
 - ii. Flap Y
 - iii. Throttle Servo
 - iv. Rudder Servo
 - v. Elevator Servo
 - vi. Battery pack into switch
 - vii. Battery power from switch into receiver (*secure junction with tape or heat shrink tubing.*)
- 2) Wrap the receiver in foam and secure with duct tape or equivalent. The receiver should be able to ‘float’ a little inside the foam.
- 3) A suggested position for the receiver is between the servo tray and mid cockpit



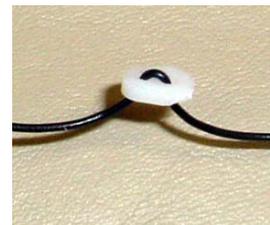
Battery weight on port side offsets weight of cylinder head.

Receiver

frame. If securing with a tie wrap you'll want to drill a hole in each of these to pass the tie wrap through.

- 4) Install the switch harness. Thinking about your trim scheme at this point is a good idea, as the switch is best hidden when located against a dark color. Alternatively, you can wait to install the switch until after you've trimmed out the model. Also consider that there is a plywood inner frame against the side wall of the fuselage, and you don't want the switch sitting across an uneven surface.
- 5) We will use the battery mounting to assist with the weight and balance of the aircraft. As such, we leave this to you to determine the best position for your model. You will want to wrap the battery in foam, and tape, again allowing 'float' for vibration isolation. You can secure the battery in your choice of location using Tie-Wraps, adhesive backed wire tie anchors, etc. Just remember that it has a certain amount of mass, and you don't want it coming loose in the cockpit during your, no doubt perfectly coordinated, aerobatic routines!
- 6) Route the receiver antenna. You have many choices here, and factors affecting your choices include quality of reception and how visible you want the antenna. Our recommendation is to exit through the top of the fuselage through a small hole just behind the canopy and run the wire to a pin in the tail.

- a. You can create a 'buckle' from the clipped of part of a servo arm that has two holes in it. You can use this to prevent the wire from pulling through the exit hole inside/behind the canopy.



- b. You can secure the end of the antenna using a 'buckle', a rubber band, and a pin in the top of the tail (directly above the hinge line) to keep the antenna in place and in gentle tension.



Fitting Wheels and Fiberglass Components

Installing Main Gear Wheel Pants – Both Gear Configurations

Wheels are assembled to the axles using collars to prevent them from slipping off. Main gear wheel pants are retained using brackets that are installed in the wheel pant. This method absorbs impacts by allowing rotation of the wheel pant, rather than breaking it.

1. Locate in the In the U.S Pack (2) Sullivan wheel pant mounting brackets. These brackets are installed on the inside of the wheel pant.



2. Locate the two main wheel Wheel Pants and drill a 5/32" dia. hole on one side of each (at the indentation) – make sure you make a left and a right by drilling on opposite sides.

3. Using the 5/32" drill to simulate an axle shaft, position the bracket on the outside of the wheel pant and mark the location of two mounting holes. Remove the bracket (or use it as a template) and drill two 1/16" (1.5mm) holes. (DuBro retainer shown in pictures, Sullivan installation is identical.)



4. Assemble the bracket bolt and nut as shown in the picture in step 1 above. Position the bracket flat side against the inside of the wheel pant, and secure using two sheet metal screws (#20) from the outside. (Using the drill shank again helps with alignment.)

5. Slide the wheel pants and wheels on the gear and trial fit/trim the wheel pant openings as necessary for access to the wheel pant bracket bolt and to facilitate putting the wheel retaining collar in place.



6. Secure the wheel pant, and retaining collar so that the wheel spins freely, and the wheel pant is snug to the axle shaft.

Installing the Nose Wheel and Wheel Pant/Fairing

The nose gear wheel pant fits the shape of the nose gear wire and is held in place by a nylon bracket after a 5/32" dia. axle hole is drilled at the bottom of the molded groove. You will need to remove the nose gear from the steering bearing blocks if you have not done so already.

- 1) Retrieve the nose wheel pant/fairing and drill a 5/32" dia. (4mm) hole at the bottom of the gear groove.
- 2) Position the Nylon Wheel pant retainer (No. 21) over the axle and drill two (2) 1/16" dia (1.5mm) holes. The holes will enter into the inside radius of the molded groove, where there is thicker resin than normal. If you would like to strengthen this area, mix up some 30 minute epoxy with flox or fine sawdust and place a 'blob' over the holes on the inside of the wheel pant. After it is well cured, you can re-drill the two holes. The screws will self tap.
- 3) Trial fit the wheel pant/fairing with the nose wheel and spacing collars. Trim the nose wheel opening as appropriate.

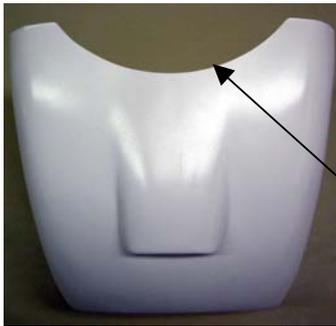


- 4) Using (2) No. 2 washer head screws, attach the gear to the fairing with the wheel pant retainer.
- 5) Reassemble the nose gear into the bearing blocks, being sure to properly orient the steering arm/Z-bent steering pushrod. Do not tighten the setscrew on the steering arm yet.

Final Cowl Fitting

Install your choice of muffler. With a .46 two stroke we find that the muffler almost fits entirely within the cowl (a small nose protrusion below the prop) with a piece of silicone extension to take it out of the rear of the cowl. For larger engines, consider purchasing a 'Pitts' type muffler.

Verify that the cowl fits properly over your selected engine, and provide openings as necessary for glow plug ignition access, needle valve access and chosen muffler configuration. Cut away a section of the bottom of the cowl to create an escape path for the engine cooling air. We like scribing an arc and cutting the opening as shown.



While trial fitting your cut-outs for the muffler, set the nose gear height so that the leg fairing clears the bottom of the cowl by at least 1/4" (6 mm). Prime, paint and attach the cowl for later weight and balance determination.



Canopy Installation, Painting and Trim



Trim the canopy to fit the fuselage using the molded in lines as a guide. Cut outside the lines on your first pass and test fit. We like using a pair of aviation or metal tin snips to do this job. Aviation tin snips are offset to one side, allowing the material to pass alongside the tool while cutting, and they have the power to make the job easy. (They come in left and right hand versions.) Good stout scissors are your next best tool.

Install the canopy to the airframe using 6 No.2 Washer Head screws. Pre-drill locations with 1/16" (1.5mm) drill, and harden the hole with thin

CA . Here we have masked off the cockpit section and sprayed it with a fleck finish (American Accents 'Stone Creations' – available at Home Depot and hardware stores in the U.S.)

Painting

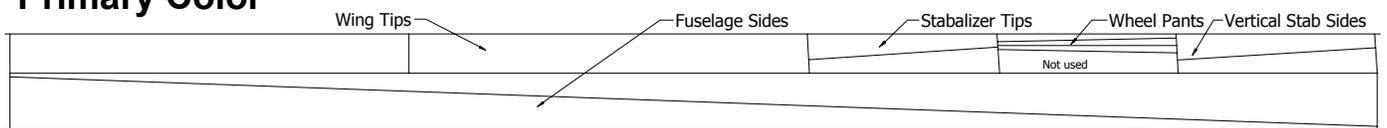
Your model is covered with a premium quality polyester covering made in Germany known as Oracover. In the U.S. this identical material is known as Ultracoat™.

As mentioned previously, the covering may have developed bubbles or wrinkles in its journey to you, caused by temperature changes. These are easily removed through the application of heat. If bubbles won't seem to go away, it is because there is air being trapped. Pierce the covering with a pin and move the iron over the covering towards the hole. Be patient as you move the iron gently and smoothly.

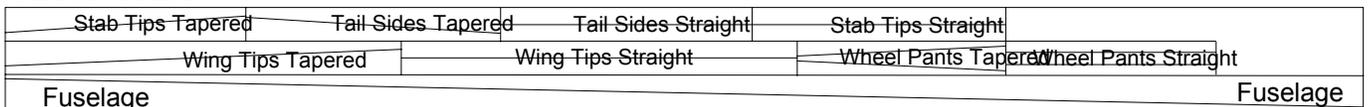
If you paint the model there is a 'best practice' technique for ensuring the best possible bond to the polyester film. Our recommendation is to visit the Top Flight Models web site and read/print their instructions for painting Monokote. The address for their instructions is: <http://www.monokote.com/lustrekote/painting-tips/topr7200tip1.html> They recommend the use of their Lustrekote paints, which have been tested for adhesion and glo fuel resistance. Horizon Hobbies now offers an equivalent paint to match the Ultracoat (which is Oracover). Both Lustrekote and the Ultracoat paints are available at hobby stores.

If you are not modeling a specific aircraft, you may choose to finish off the model using the trim colors we have supplied. The model comes with three (3) sheets of Vinyl trim, which transforms the model significantly! The sheets are computer cut and you will want to orient the pieces to the diagrams below before removing the pieces. You can use the box cover picture as an example. We used the primary color as the bottom stripe on the fuselage and outside stripes on the wings and stabilizers. The dark Grey is the thinnest stripe and makes a good transition to the lighter silver color. Note that you can cut a curve into the three stripes after they are applied to add a different dimension to the look.

Primary Color



Silver Trim



Grey Trim: Layout is identical to Silver, only stripes are thinner.

Weight and Balance – This is probably the most critical assembly step you do!

We recommend setting the balance of the model at 3 1/8 " aft of the leading edge, which is approximately the 25% chord line. Moving the balance point further forward, up to 1/2", will increase the pitch stability of the model. Err in that direction for the first few flights. Moving the balance point aft will decrease the pitch stability, giving a livelier

feel - at the risk of being able to easily over-control the aircraft. Try our setting and then feel free to experiment. The Zodiac XL is a wonderfully responsive model.

Note that we have left off the top of the 'engine box' under the cowling to allow the insertion of weight behind the firewall if desired. Now is a good time to glue the box cover in place – or tape over if you'd prefer future access to this area.

Controls Set-up

As a starting point, limit control throws to 1/2" (9mm) travel each direction at the ends of the ailerons, 3/4" for the elevators and 1/2" either side of center for the rudder. For the rudder in particular, while it does not seem like much travel remember that this is a full flying rudder, and there is a lot of surface area there.

When you are comfortable with the flight characteristics of the model, you can increase the throws. ***If you like doing snap rolls, this model will do them in a heartbeat if you want to increase the rudder action!***

Bench Pre-Flight

In case we didn't mention it before:

- Make sure all clevises have their silicone keeper rings in place and as close to the servo or control arm as possible.
- Install the radio 'On-Off' switch if you were waiting until after the trim was done.
- Make sure all servos have their output arms held in place by the center screw
- Be sure the steering arm has been tightened – consider using loctite to secure
- Check that all control surfaces move freely
- Check that control surfaces are at the same relative angles – i.e. in line with the flying surface to which they are attached.
- Check that all control horns are firmly attached
- Check that all control surfaces are firmly hinged by tugging on them
- Put some fuel in the tank and make sure the plumbing is correct
- Check correct operation of control surfaces with your radio – that left is left, etc..
- Go have fun and enjoy safely.