EXTRA 300XS

ALMOST READY TO FLY

EXTRA 300XS ARF ASSEMBLY MANUAL

INTRODUCTION:

Congratulations on the purchase of your SIG EXTRA 300XS ARF kit! Properly assembled, powered and flown, the EXTRA 300XS will surely become one of your favorite models. The construction of this ARF kit is extremely well engineered, providing a structure that is very light and strong. This is one of the reasons it flies as well as it does, using the recommended engine sizes. The EXTRA 300XS has superb take-off and landing characteristics combined with remarkable aerobatic capabilities. The airframe has been specifically designed to provide you with a "zeroed out" model. This is to say that the wings and horizontal stabilizer sit at 0° in relationship to the thrustline. In turn, this provides you with a model that is completely "honest" in any attitude. We will cover more detailed set-up information later in the assembly instructions.

3D CAPABLE! For those of you who are interested in 3-D aerobatics, we have provided the EXTRA 300XS with double beveled elevator and rudder hinge lines. This means that the control surfaces can be driven to throws in excess of 45° for extreme 3-D maneuvers!

ENGINE NOTE: Due to the large number of useable engines for this model, we simply cannot cover every possible engine installation. However, the volume of space provided inside the large cowling should make it easy to mount virtually any engine within the suggested size range.

EASY TO ASSEMBLE! Since the general construction, sanding and covering of the airplane have already been done at the factory, the only remaining tasks are those of final assembly and radio and engine installations. We urge you to follow these assembly instructions closely to produce the model as it is intended to be. We understand that many modelers love to "kit bash" and incorporate their own modifications. Simply be aware that certain assembly procedures for this airplane must be followed in the correct sequence. Deviation from these instructions could lead to problems beyond our control. Plan carefully!

ADDITIONAL ITEMS NEEDED TO COMPLETE THIS MODEL

RADIO EQUIPMENT

We highly recommend the use of a modern programmable computer radio. Such radio systems allow you to easily set and adjust every channel and additionally pre-program various flight functions to suit your individual style of flying. Four channels are required to fly your EXTRA 300XS - rudder, elevator, ailerons, and throttle. However, you will require a total of six servos - ailerons (2), elevators (2), rudder (1), and throttle (1).

SERVOS: Since your EXTRA 300XS is a large, highly aerobatic airplane and because the control surfaces are also large, we urge you to use appropriate servos on all the flight surfaces (ailerons, elevator, and rudder). This model should not be flown with "standard" 40 - 50 inch/ounce output servos! The EXTRA is big enough to impart very large air loads and standard servos will quickly fail, resulting in loss of control. You should use heavy-duty ball-bearing servos with at least 70 inch/ounces of torque or more to drive the ailerons, elevators, and rudder. If available, use a servo with metal gears instead of plastic gears. Specifically in our prototype models we used Airtronics® #94731 servos for the ailerons, elevators, and rudder. This is a dual ball-bearing servo, rated at 77 inch/ounces of torque. Another good choice is the Hitec™ #605MG servo which has 76 inch/ounces of torque and metal gears. These servos or their equivalent from other manufacturers, can be relied upon to work well throughout the EXTRA's flight envelope. A "standard" servo is adequate for the throttle.

SERVO ARMS: We also suggest that you consider using after-market reinforced plastic servo output arms, such as the Du-Bro "Super Strength" products. These output arms are available to fit any brand of servo. They are very strong and work well with this model. We highly recommend their use with the pull-pull rudder system used in this EXTRA. Using typical plastic servo output arms with the braided steel cables for rudder control, may cause problems due to the potential of wearing of the plastic by the cables over extended use. The Du-Bro output arms are molded from considerably tougher material and these have held up extremely well in our prototypes.

SERVO EXTENSION CHORDS: You will need two 12" servo extension chords for the ailerons, one standard Y-harness chord for the two aileron servos and one Y-harness chord for the two elevator servos. The Y-harness chords are used to connect two servos to a single connector going into the receiver. In the case of the two aileron servos a standard Y-harness chord, available from your radio manufacturer, will work fine. In the case of the two elevator servos see the following note about a great product called the "Miracle Y".

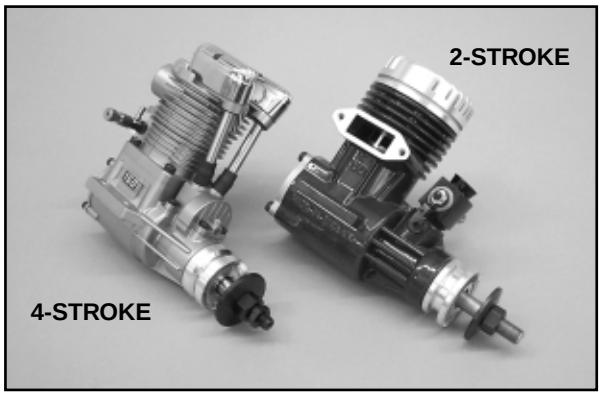
MIRACLE "Y": Note in the photos that the elevator servos will be mounted on opposite sides of the fuselage in exact "mirror image" to each other (i.e.; with the pushrods coming off the top of each servo in direct line with the control horns). This is done so the geometry of the servos, pushrods, and horns is exactly symmetrical on both sides, providing the exact same response to control inputs for each elevator. This is very important in an all out aerobatic machine like the EXTRA! Normally in order to have this type of setup work properly with a standard Y-harness you would have

to electronically reverse the wiring inside one of the elevator servos so that both elevators will go up (or down) at the same time. However, there is an after-market Y-harness available that electronically reverses one of the elevator servos for you. It also has a centering adjustment pot that lets you dial in the elevators exactly to a neutral relationship with each other. The product is called the "MIRACLE Y™ Servo Reversing Y Adapter", sold by MAXX PRODUCTS of Lake Zurich, IL. It can be ordered with any radio manufacturer's connectors you specify. We have thoroughly tested this product and found it to be reliable, easy to use and very reasonably priced. In addition, it is a total of 24" in length - 12" of elevator extension cables and a 12" cable lead to the receiver. Perfect for the EXTRA 300XS!

RX BATTERY PACK: Finally, since you will be using a total of six servos to fly this airplane, we strongly suggest you use a large capacity battery pack for use in this model. We have used both 1000 mAH and 1200 mAH packs with very good results. Using the light 1000 mAH pack, we have been able to safely fly five or six flights during any given flying session, a reasonable amount of flying time for most modelers. Naturally, a larger pack provides more flight time but remember that larger can also equate to heavier. We also suggest that you routinely use an Expanded Scale Voltmeter (ESV) at the field to check the charge condition of your batteries. This common piece of field equipment can save your model!

ENGINE & PROPELLER

The SIG EXTRA 300XS ARF has been flown with a wide variety of engines. As everyone knows, there is no substitute for power and the engines recommended for this model all provide good power margins. Naturally, the larger engines in this range make more power and will fly the EXTRA with more authority than the smaller engines. It is simply a matter of how you want to fly the airplane.

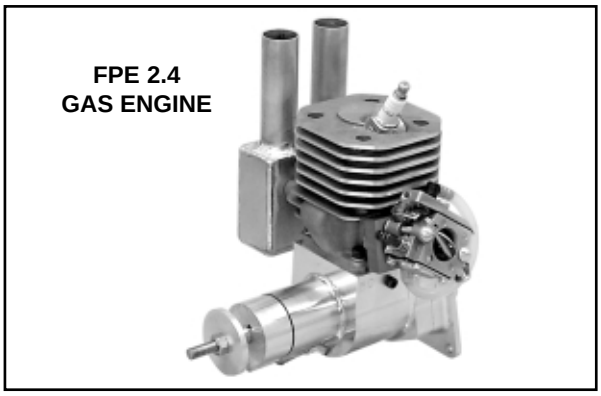


2-STROKE ENGINES: If you want to use a 2-stroke engine, we recommend an engine with 1.20 - 1.50 cu. in. displacement. We have tested both the Irvine 1.20 and 1.50 2-stroke engines extensively and found that both engines provide suitable power and are easy to install and operate in the EXTRA 300XS. In the case of the Irvine 1.50 with a 16 x 8 APC prop, we have excellent vertical performance - not unlimited vertical, but it will go straight up for an impressive distance, much longer than most typical R/C models.

When using a 2-stroke engine inside a cowling, mufflers are often a problem. But not in this case! SIG stocks a special in-cowl muffler for use with either the Irvine 1.20 or 1.50 engines in the EXTRA 300XS ARF. This muffler is very effective and fits perfectly inside the cowling. The SIG part number for this in-cowl muffler is #IRV120150M.

4-STROKE ENGINES: If you want to use a 4-stroke engine, we recommend 1.40 - 1.80 cu. in. displacement. Good choices currently on the market would be the YS 1.40 and the Saito 1.80.

GAS ENGINES: If you want to use a gas engine, we recommend a maximum displacement of 2.4 cu. in. Our hands down favorite is the FPE 2.4 cu. in. gas engine, available from SIG. Weighing only 52 ounces, this compact powerhouse delivers approximately 18 pounds of thrust with a 20 x 10 prop. You can imagine how that makes a 12 - 13 pound EXTRA perform! If you decide to install a gas engine in your EXTRA, be sure to substitute a gasoline compatible fuel tank stopper and fuel tubing for those items supplied in this kit. The fuel tank body itself is gasoline compatible.



KIT CONTENTS

The following is a complete list of every part included with your EXTRA 300XS ARF kit. Each part has been individually inspected and carefully packed here at the SIG factory by SIG employees. We urge you to be as careful as we have been, using the check-off blocks to inventory your kit before beginning assembly.

FUSELAGE & related parts

- ❑ 1 Fuselage, covered
- ❑ 1 Fuselage Bottom Fairing, covered
- ❑ 1 1/8" x 2-9/16" x 7-7/8" plywood Front Fuselage Hatch
- ❑ 1 Fiberglass Cowling, painted
- ❑ 1 Molded Plastic Tail Fairing, painted
- ❑ 1 Molded Clear Plastic Canopy
- ❑ 1 Molded Plastic Cockpit Deck, painted
- ❑ 1 Printed Instrument Panel

TAIL SURFACES

- ❑ 1 Fin, covered
- ❑ 1 Rudder, covered
- ❑ 1 Stabilizer , covered
- ❑ 1 Right Elevator, covered
- ❑ 1 Left Elevator, covered

WINGS & related parts
- ❑ 1 Right Wing Panel, covered
- ❑ 1 Right Aileron, covered
- ❑ 1 Left Wing Panel, covered
- ❑ 1 Left Aileron, covered
- ❑ 1 Right Aileron Servo Hatch, covered
- ❑ 1 Left Aileron Servo Hatch, covered
- ❑ 4 3/8" x 3/4" x 3/4" Hardwood Aileron Servo Mounts
- ❑ 1 Hardwood Wing Joiner
- ❑ 1 Aluminum Tube Rear Wing Joiner
- ❑ 2 1/8" x 1-1/2" x 1-1/2" Plywood Wing Bolt Plates
- ❑ 2 1/4-20 x 2 Nylon Wing Bolts

LANDING GEAR & related parts
- ❑ 1 Aluminum Main Landing Gear
- ❑ 3 M4 x 15mm PWA* Bolts; for landing gear
- ❑ 2 Steel Wheel Axles
- ❑ 2 M8 Lock Nuts; for wheel axles
- ❑ 2 3-3/4" dia. Main Wheels
- ❑ 4 Wheel Collars with Set Screws
- ❑ 1 Right Fiberglass Wheel Pant, painted
- ❑ 1 Left Fiberglass Wheel Pant, painted
- ❑ 4 M3 x 15mm PWA* Bolts; for wheel pants

CONTROL SYSTEM PARTS
- ❑ 3 RIGHT Metal Control Horns; for ail.(1), ele.(1), & rud.(1)
- ❑ 3 LEFT Metal Control Horns; for ail.(1), ele.(1), & rud.(1)
- ❑ 24 M2.6 x 10mm Metal Screws; for control horns
- ❑ 2 4-40 x 2-3/4" Threaded Pushrods; for elevators
- ❑ 2 4-40 x 3-5/8" Threaded Pushrods; for ailerons
- ❑ 6 4-40 Threaded R/C Links; for ail.(2), ele.(2), rud.(2)
- ❑ 6 4-40 Hex Nuts; jam nuts for R/C links
- ❑ 4 4-40 Solder Links; for ail.(2), ele.(2)
- ❑ 1 1/8" od x 18" Nylon Pushrod Tubing; for throttle pushrod
- ❑ 1 1/16" od x 18" Stranded Steel Cable; for throttle pushrod
- ❑ 1 1/8" x 5/8" x 1-1/4" plywood Throttle Tube Support
- ❑ 1 2-56 size Solder Link; for engine end of thr. pushrod
- ❑ 1 Brass Pushrod Connector Body; servo end of thr. pushrod
- ❑ 1 Molded Nylon Retainer; for pushrod connector
- ❑ 1 4-40 x 1/8" Socket Head Bolt; for pushrod connector

TAILWHEEL ASSEMBLY PARTS
- ❑ 1 Main Leaf-Spring with Steering Arm, Wheel Yoke, and Tailwheel installed
- ❑ 1 Short Leaf-Spring
- ❑ 2 Coiled Steering Springs
- ❑ 1 Metal Rudder Horn (T-shaped)
- ❑ 2 M2 x 9mm PWA* Screws
- ❑ 3 M3 x 14mm PWA* Screws

PULL-PULL CABLE SYSTEM PARTS
- ❑ 1 .024" dia. x 96" Steel Cable
- ❑ 4 Copper Swage Tubes
- ❑ 4 Threaded Rigging Couplers with Knurled Stop Nut
- ❑ 4 Metal JDL R/C Links

FUEL TANK PARTS
- ❑ 1 450cc (15.2 oz.) Oval Plastic Tank
- ❑ 1 Rubber Stopper
- ❑ 1 Metal Front Clamp
- ❑ 1 Metal Rear Clamp
- ❑ 1 Clamp Bolt
- ❑ 1 Metal Clunk Pickup
- ❑ 2 Aluminum Tubes
- ❑ 1 Fuel Tubing for inside tank
- ❑ 2 9" Fuel Tubing

SPINNER PARTS
- ❑ 1 3" dia. Spinner, White
- ❑ 1 3" dia. Back Plate, White
- ❑ 1 Prop Shaft Adapters
- ❑ 4 Self-Tapping Screws

MISCELLANEOUS
- ❑ 20 M2.6 x 10mm PWA* Screws; for aileron servo hatches(8), ail. servo mount blocks(4), fuselage hatch(4), cowling(4)
- ❑ 6 M3 x 8mm PWA* Screws; for canopy
- ❑ 2 Glass-Filled Engine Mounts
- ❑ 4 10-32 x 1" Socket-Hd. Mtg. Bolts; for engine mount
- ❑ 4 10-32 Blind Nuts; for engine mount
- ❑ 4 #10 Flat Metal Washers; for engine mount
- ❑ 1 Decal Sheet

** PWA = phillips washer-style head*

NOTE ABOUT COVERING MATERIAL

Your EXTRA 300XS ARF has been professionally covered with **Oracover® #10 White, #54 Violet, and #71 Black**. *(Note: In the United States, Oracover® is sold under the name of Hangar 9 Ultracoat®. The equivalent Ultracoat colors are called #870 White, #868 Smoke Purple, #874 Black).*

Oracover® is well known for its ease of application, light weight and consistency of color. If you live in a drier climate, you may notice that some wrinkles might develop after removing the covered parts from their plastic bags. If that is the case, there is no need to be alarmed. This is perfectly normal in low humidity climates. Your model was built and covered in a part of the world with relatively high humidity and therefore the wood was likely carrying a fair amount of moisture. When exposed to drier air, the wood typically loses this moisture, dimensionally "shrinking" in the process. In turn, this may cause some wrinkles. (If you've been in modeling long, you've undoubtedly noticed that most iron-on coverings stay tight in the summer only to loosen a little in drier winter conditions.)

Any wrinkles that appear in the covering are easy to remove by using a hobby-type heat iron. We suggest covering the iron's shoe with a thin cotton cloth, such as an old T-shirt, to prevent scratching the film. The iron should be set to about 280° - 300° F.

First, use the heated iron to go over all the seams and color joints in the covering, making they are all sealed and well adhered. Then use the heated iron to lightly shrink the material - do not press on it. Once the covering is tight, lightly iron the material back down to the wood. You can also use a hobby-type heat gun to re-shrink the covering, but you must be extra careful around the seams. Re-heating seams may cause them to "creep", making them unsightly.

MODELER'S TIP: One of the most common problems associated with shrinking any covering film is controlling the heat around seams. Heat applied close to or directly onto seams re-heats the covering adhesive and the seam will often "crawl". This is easy to control. Just tear a few paper towels into strips and soak them in cool tap water. Lay the wet strips over any covering seam and use your heat gun or iron as you normally would. The wet strips keep the seam cool while the covering immediately next to it shrinks. This tip works great with any iron-on covering.

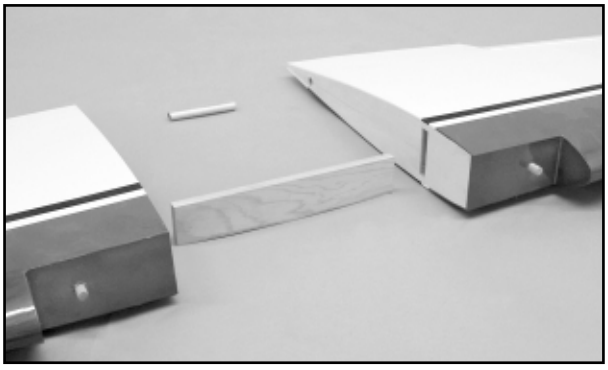
REQUIRED TOOLS

For proper assembly, we suggest you have the following tools and materials available:

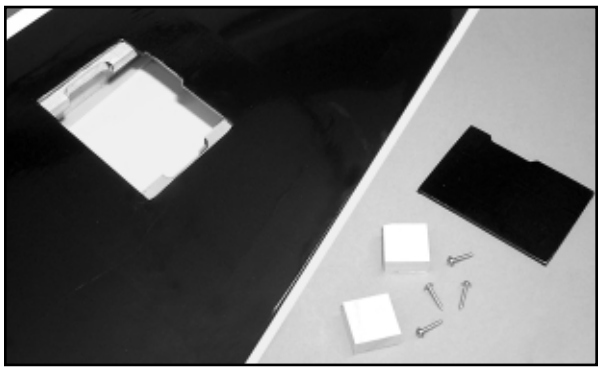
A selection of glues - SIG Thin, Medium and Thick CA,
and SIG Kwik-Set 5-Minute Epoxy
Threadlock Compound, such as Loctite® Non-Permanent Blue
Silicone Sealer - clear or white
Screwdriver Assortment
Pliers - Needle Nose & Flat Nose
Diagonal Wire Cutters
Small Allen Wrench Assortment
Drill with Assorted Drill Bits
Pin Vise for Small Dia. Drill Bits
Hobby Knife With Sharp #11 Blades
Scissors
Covering Iron and Trim Seal Tool
Masking Tape
Paper Towels
Power Drill With Selection of Bits
Dremel® Tool with Selection of Sanding and Grinding Bits
Soldering Iron and Solder
Large Fuel Tubing

WING ASSEMBLY

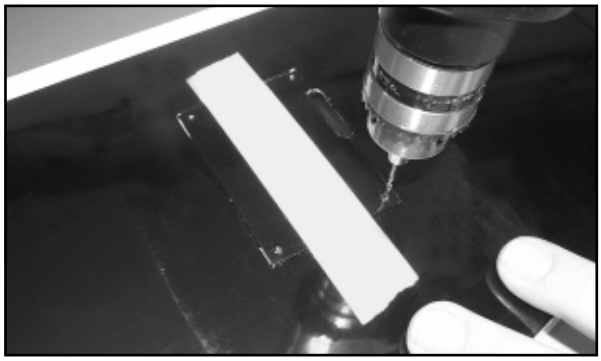
Before starting actual construction, trial fit both wing panels onto the Hardwood Wing Joiner and the Aluminum Tube Rear Wing Joiner. Check to see that the wing panels fit together in proper alignment, and that both root ribs come into firm, straight contact with each other. If the Hardwood Wing Joiner requires a little trimming to achieve this fit, do so now. NOTE: Be sure you've got the Hardwood Wing Joiner right side up - the greater angles are on the bottom.

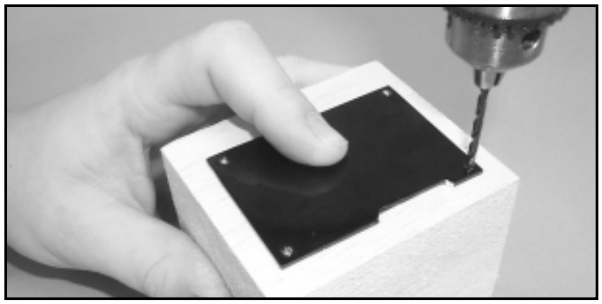


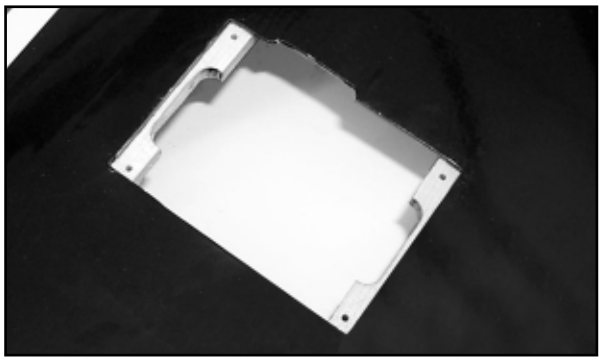
❑ 1) Locate the two pre-covered aileron servo hatches and eight M2.6 x 10mm PWA Screws. Trial fit the hatches into the aileron servo openings to determine which hatch goes in the right wing and which goes in the left wing. Tape the hatches in place, aligning their servo arm cutouts with the ones in the wing openings.



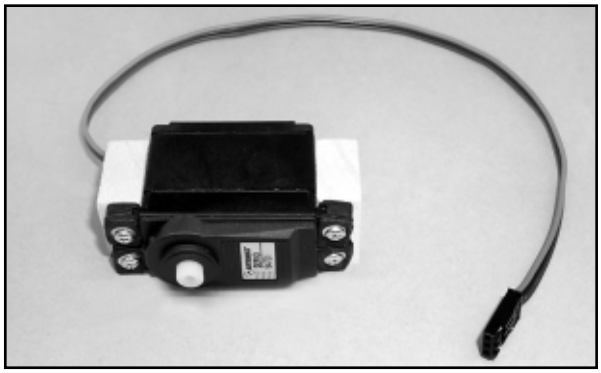
❑ 2) Drill a 3/64" (or #56) dia. hole near each corner of the hatch. Drill completely thru the hatch and into the hardwood mounting beams that are in the wing. Remove the hatch. Redrill the holes in the hatch with a 7/64" dia. bit to allow clearance for the screws.



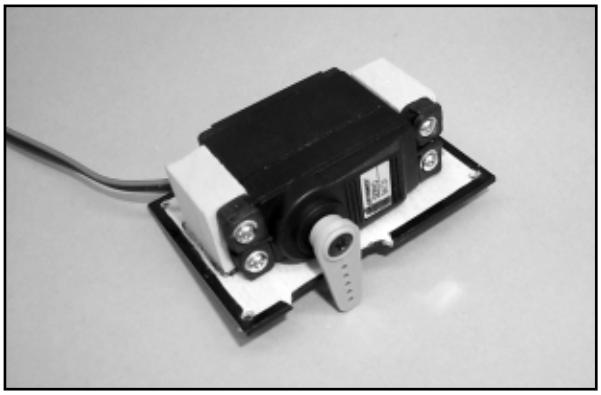




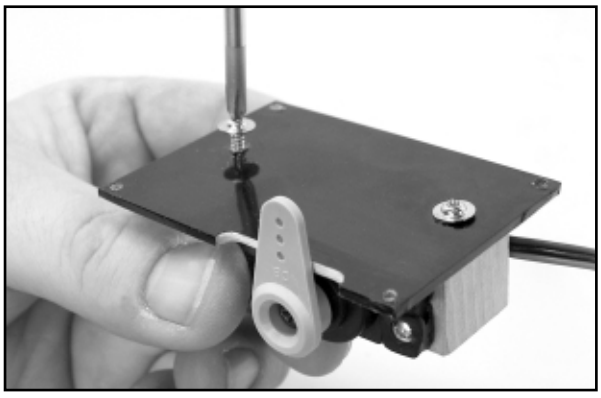
❑ 3) The aileron servos are mounted to the back, uncovered sides of the servo hatches. From the kit contents, locate the four 3/8" x 3/4" x 3/4" hardwood aileron servo mounts. You will also need the servos and the servo mounting grommets and screws supplied by your radio manufacturer during this step. Remove the servo output arm and lay the servo flat on its side. Position two of the mounting blocks beneath the servo's mounting arms, also flat on the same surface as the servo. Drill appropriate servo mounting holes into the wood mounting blocks. Use the screws that came with your radio system to now mount the servos to the two mounting blocks.



❑ 4) Install the output arm back onto the aileron servo, in neutral position. Place the servo/mounting block assembly onto the backside of the servo hatch, centering the output arm with the half slot opening. The servo output arm must be able to move freely back and forth without touching the slot's edge - about 1/32" clearance is adequate. With the servo now in this position, use a sharp pencil to mark the locations of the servo mounting blocks onto the hatch. Remove the servo from the hatch and apply thick CA glue or 5-minute epoxy to the bottoms of the servo blocks and glue them in place to the hatch, again checking for output arm clearance. Place a weight onto this assembly and allow it to dry. Repeat this step to mount the other aileron servo to its hatch.



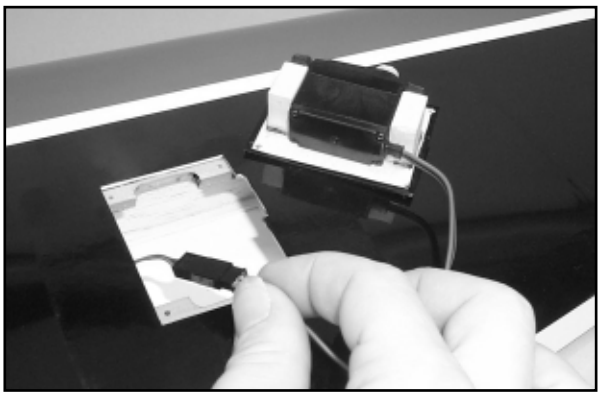
❑ 5) Locate four M2.6 x 10mm PWA Screws. These screws will be used to mechanically secure each servo mounting block to the servo hatches. Use a ruler to find the approximate center of each block and mark the location onto the covered side of the servo hatch. With a 1/16" dia. bit, drill a pilot hole - about 1/4" deep - through the servo hatch and into the mounting block, at the marks just made. Install and tighten the screws in place.



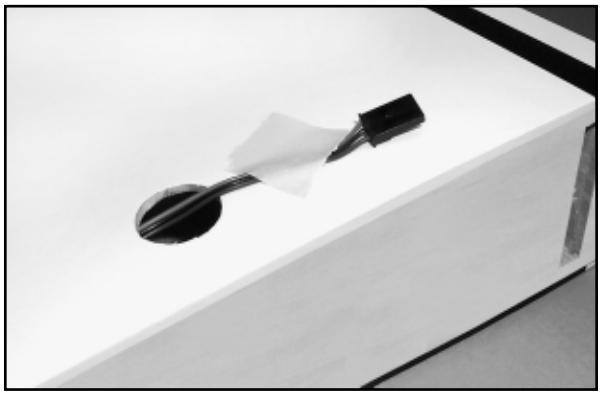
❑ 6) Before installing the aileron servos/hatches into the wing panels, use your radio system to center both servos and to check servo travel. Make sure both servo output arms are 90° to the servos and that they are long enough to clear the wing's bottom surface during extremes of travel.

a. Now attach 12" long servo extension chords to both aileron servos. *(Note: Be sure to put a piece of tape around the connecting plugs so they can't come apart while hidden in the wing.)*

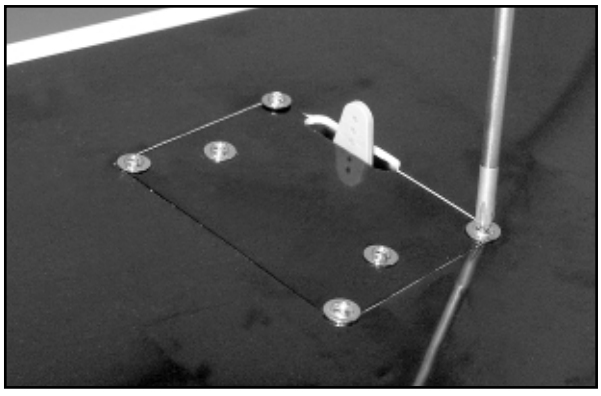
b. Feed the servo extension chords into the wings through the servo hatch opening, then through the holes in the ribs and finally out through the round holes provided at the center of each wing panel. *(Note that a piece of string has been factory-installed in the wing panels to make it easy to pull the extension chords through the wing.)*



c. After you get the end of the extension chord all the way through the wing, tape the loose end of the chord to the wing's top surface, so that it won't fall back inside the wing.



d. Finally, secure the aileron servo/hatch in place in the wing with M2.6 x 10mm PWA Screws. *(NOTE: Did you remember to install the servo output arm screws in each servo?)*

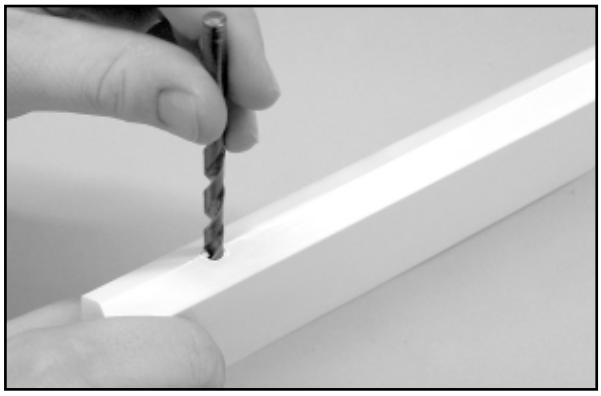


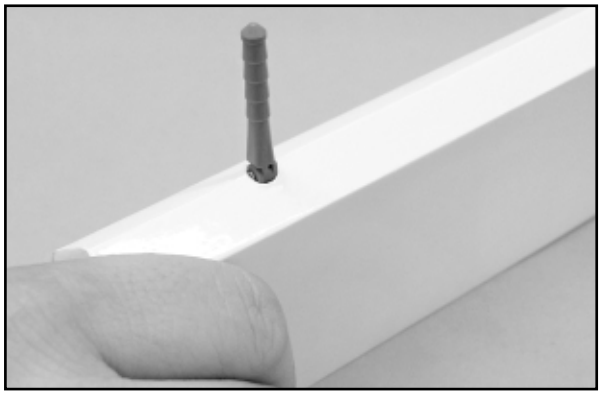
❑ 7) Next you need to permanently glue the aileron hinges in place. Notice that 4 hinges have been factory-installed in the each aileron, but they are not glued.

a. First remove the all the hinges from the ailerons and wing.

b. Notice that the holes the hinges came out of are the correct diameter for the round shank of the hinge, but not large enough to

accept the square "knuckle" part of the hinge. You need to countersink the holes to accept the knuckle part of the hinge, so that the hinge can be pushed in far enough for the pivot point to line up with the front "V" point of the aileron leading edge. We recommend enlarging the opening of the hinge holes slightly with a hand-held 1/4" dia. drill bit. You only need to twist the drill bit in about an 1/4" or so. Countersink all of the hinge holes in the leading edge of the ailerons in this manner. This will allow a gapless hinge line with proper hinge movement.





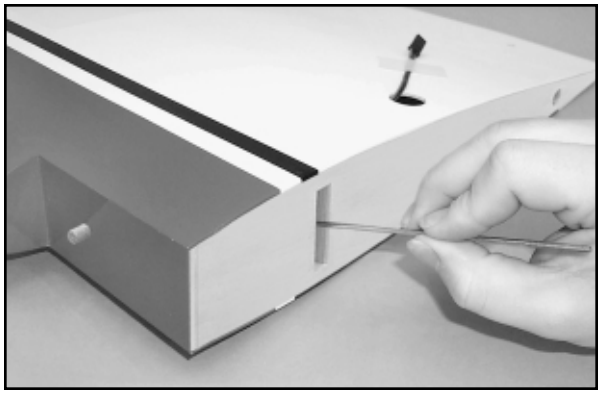
c. Trial fit the ailerons back onto all the hinges and the wing one more time to make sure everything lines up properly. You want the beveled leading edge of the aileron to be as close to the mating wing as possible while still allowing full movement. When satisfied that everything is good, take it back apart for the gluing process.

d. We recommend using slow drying epoxy glue for gluing the hinges so that you will have ample time for cleanup and alignment. Epoxy the hinges into the ailerons first and let dry. Then hinge each aileron to its appropriate wing panel. The best procedure with this type of hinge is to inject the glue into the hole and then insert the hinge. Use a clean cloth soaked with methanol or rubbing alcohol to wipe off any excess glue that has oozes out onto the control surface. Then move on to the next hinge.

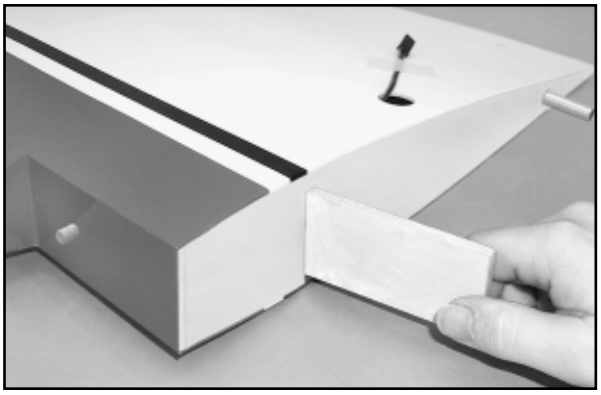
IMPORTANT NOTE: Be sure to correctly identify which aileron is for the right wing and which is for the left wing by looking for the aileron horn plywood mounting pad that is inset into the BOTTOM side of each aileron, underneath the covering.

MODELER'S TIP: Apply a coat of petroleum jelly, such as Vaseline®, to the hinge knuckle. The petroleum jelly will keep the epoxy from sticking to the knuckle and causing a bind. Do not get petroleum jelly on the round shank of the hinge, where you want the glue to stick.

❑ 8) Now it's time to glue the wing panels together permanently! Start by mixing up an ample amount of slow-drying epoxy glue. Use a wire, stick or small throw-away brush to liberally coat the inside of the wing joiner pockets in the end of the wing panels with glue. Then apply a liberal coat of epoxy to the exposed center ribs of each wing panel.



Next apply glue to the hardwood front wing joiner and to the aluminum tube rear wing joiner. Next slide the wing joiners into one wing panel, and then slide the other wing panel in place over the exposed end of the joiners, joining the two panels at the center. Firmly press the wing panels together and wipe off any excess glue with a paper towel and alcohol. Make sure the wing panels are accurately aligned with each other by checking the alignment of the leading and trailing edges. Use tape at the leading and trailing edge joints to hold them in the correct position. Place a clean rag on the floor next to a wall. Stand the wing upright, with one wing tip on the cloth, as vertical as possible, leaning against the wall. Place a weight on the upper wing tip and allow this assembly to fully cure. Continue watching for excess epoxy oozing out of the joint as it cures and wipe it off.

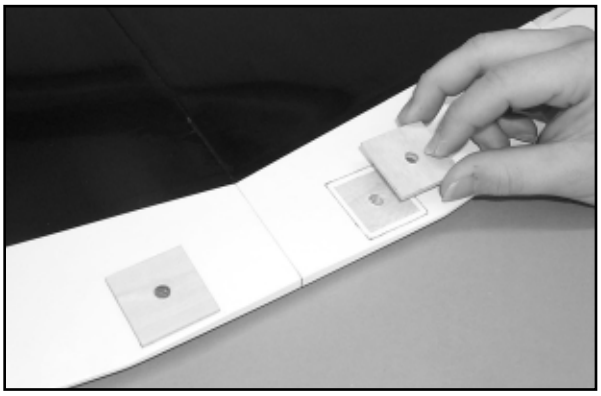


NOTE: It's very important to use plenty of epoxy when gluing the wing panels together. The strength of your wing joint depends on it! Don't worry if the excess glue oozes out and gets on the covering material. With slow-drying epoxy, you will have plenty of time to clean up all the glue smears with a paper towel soaked in rubbing alcohol. Also, if possible get someone to help you with this procedure. An extra set of hands makes the job much easier! While one person holds the two wing panels firmly together in correct alignment, the other person can clean off the excess glue and tape the wing panels together.

❑ 9) The wing is now fitted to the fuselage. First engage the two dowels at the front of the wing into the two holes in the fuselage former. If you cannot get both dowels into their respective holes at the same time, it may be that one of the holes is just slightly off (left to right) due to a misalignment in the manufacturing process. If this is the case, it shouldn't be off very much, and you should be able to correct it easily. Use a sharp #11 blade in your hobby knife to adjust ONE of the holes slightly to the left or right to achieve a good fit. Once the wing dowels properly engage, press the rear of the

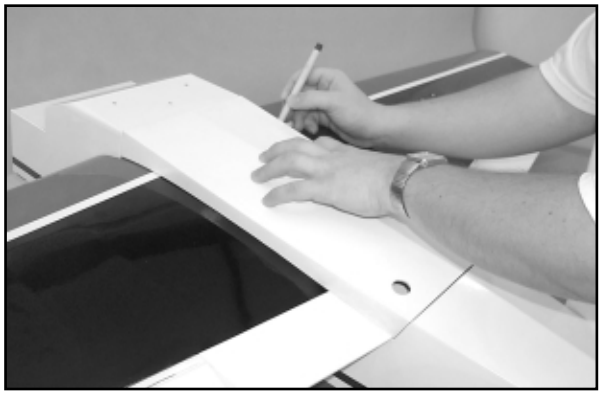
wing in place into the wing saddle and check the overall fit before proceeding.

❑10) Locate the two 1/8" x 1-1/2" x 1-1/2" plywood wing bolt plates. The wing bolt plates are already pre-drilled in the center to pass the nylon wing bolts. Notice that there are also holes for the wing bolts pre-drilled in the rear center section of each wing panel. Hold one of the wing bolt plates in position on the BOTTOM of the wing, aligning the hole in the plate with the bolt hole in the wing. Use a pencil (or fine tip marker) to draw the outline of the plate onto the wing. Do the same for the other wing bolt plate, marking its location on the bottom of the other wing. Use a hobby knife to remove the covering material on the wing, about 1/8" inside the wing bolt plate outlines. Glue the wing bolt plates to the wing with thick CA glue, carefully aligning the bolt holes. Make sure there is no excess glue inside the holes and let dry.



❑11) Locate the two nylon wing bolts. Mount the wing in place on the fuselage, using the nylon wing bolts to secure the trailing edge of the wing to the fuselage. The nylon wing bolts should pass freely thru the holes in the wing and thread into the blind nuts that are pre-installed in the fuselage. If the wing does not assemble cleanly and freely to the fuselage at this point, you need to find the cause of any binding and fix it now, before proceeding.

❑12) With the wing mounted to the fuselage, set the pre-covered fuselage bottom fairing in place on the bottom of the wing. Carefully align it with the fuselage. Use a felt-tip pen to mark the location of the bottom fairing on the wing surface. Remove the wing from the fuselage. Put a bead of silicone adhesive on all the edges of the bottom fairing that will contact the wing - i.e.: the sides, the front and back edges, and the inner cross pieces. Carefully set the bottom fairing back in place on the wing, right on the guidelines. Tape the bottom fairing to the wing in a few places to keep it from moving. Clean off any excess silicone that oozes out by first scraping it off with a clean flat stick, and then wiping the smears with a rag soaked in methanol or CA debonder. Let dry thoroughly.



OPTIONAL: If you'd rather use glue instead of silicone adhesive to hold the bottom fairing to the wing, be sure to strip the covering material off the bottom of the wing inside the marked lines before gluing so that you have a wood-to-wood joint. Also strip the covering material off the mating edges of the bottom fairing. Be very careful not to cut into the balsa wood wing sheeting while you are cutting away the covering material! When ready, permanently glue the fuselage bottom fairing onto the bottom of the wing with thick CA glue or epoxy.

❑ 13) Plug a standard Y-harness chord into the "aileron" slot in your receiver. Plug the ends of your aileron servo extensions coming out of the wing into the dual ends of the Y-harness chord. Connect the airborne battery pack and switch harness to your receiver and then turn on your transmitter. You should now be able to operate your aileron servos.
Perform the following setups:

a. Center the aileron servos using the transmitter trims and/or the radio computer options.

b. Position the servo output arms on the output shaft to exactly 90° upright when the servos are neutral.

c. Test the action of the servos, making sure the output arms move freely and that they move in the correct directions for left and right aileron action.

d. Turn off the radio system and disconnect the aileron servos from the Y-harness.

❑ 14) Locate one left and one right metal control horn and eight M2.6 x 10mm Metal Screws.

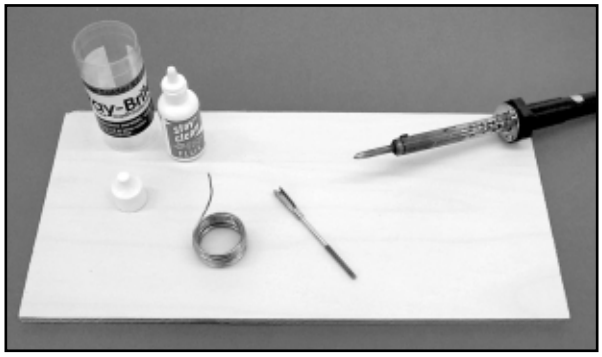
a. Tape the ailerons in neutral position and lay the wing upside down on your bench.

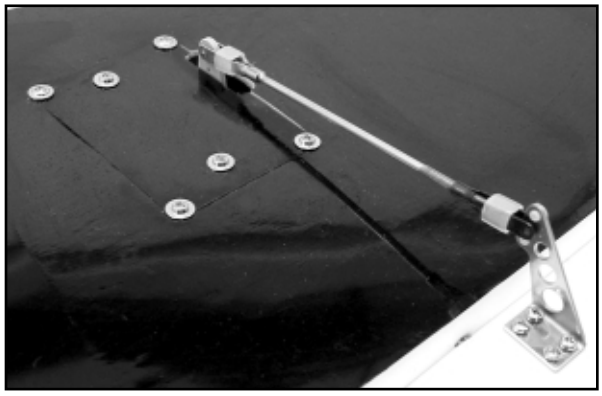
b. Position one of the control horns in place on the bottom leading edge of the appropriate aileron. Be sure to line up the arm of the control horn with the servo output arm. Also make sure that the holes in the control horn are directly over the hinge line. Then mark the control horn's 4 mounting hole locations onto the aileron with a fine-point marker pen.

c. Drill a 3/64” dia. (or #56 drill) pilot hole into the aileron at each mark. Mount the control horn in place, using the M2.6 x 10mm Metal Screws. Repeat this process to attach a control horn to the other aileron.

IMPORTANT: After you finish mounting the control horns on the ailerons for the first time, take them back off and set them aside temporarily. Then put a few drops of Thin CA into each of the screw holes in the aileron. The Thin CA will soak into the threads in the wood, and when it dries the holding power of the threads will be much stronger. Use Thin CA only, not medium or thick CA. Let the Thin CA dry completely before remounting the control horns onto the ailerons.

❑ 15) Locate two 4-40 x 3-5/8" Threaded Pushrods for the ailerons, two 4-40 Solder Links, two 4-40 Hex Nuts, and two 4-40 Threaded R/C Links. Use a soldering iron (or torch) and resin core solder to attach a solder link onto the unthreaded end of one of the threaded pushrods. Thread a 4-40 hex nut onto the threaded end of the pushrod, followed by a 4-40 threaded R/C link. Connect the solder link end of the pushrod to the aileron servo output arm. Holding the other end of the pushrod up next to the aileron horn, adjust the threaded R/C link as needed to match its connecting pin to the horn. Repeat this process to make a pushrod for the other aileron. Remove the tape holding the ailerons in neutral position.





❑16) Reconnect your radio system and check the aileron servo action. Make sure the ailerons are operating freely and smoothly. Final adjustments of all the control surfaces will be done after assembly is complete. This completes the wing assembly.

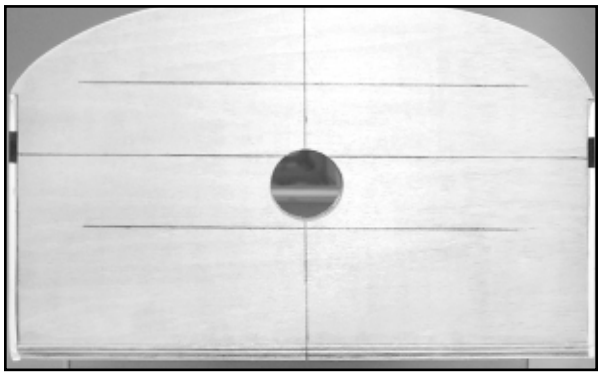
ENGINE MOUNTING

It is assumed that most modelers will side mount their engine, to keep as much of the engine as possible inside the cowling. The EXTRA has a large amount of space inside the cowling for this type of installation and it is highly recommended. Certainly the engine could be mounted in any position, including upright or inverted, as long as it is understood that a large part of the cowl will have to be cut to clear it. These instructions will describe the installation of a single-cylinder 2-stroke glow engine (Irvine 1.50) mounted on its side. Other engine installations should be similar, however there may be some differences that you will have to adjust for in order to mount your particular engine.

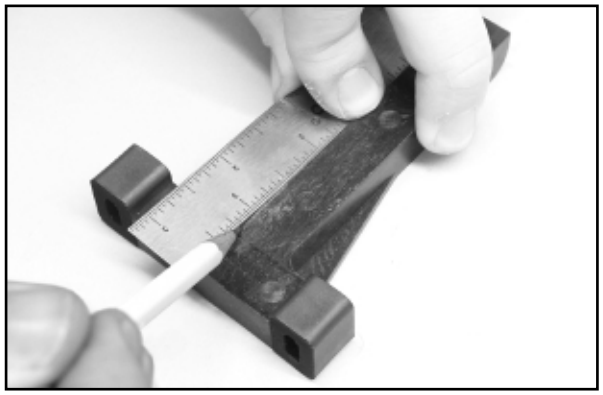
NOTE: Size Limit on Glass-Filled Engine Mounts!
The plastic engine mounts provided in this kit are intended for use with any brand 1.20 to 1.50 size 2-stroke or 4-stroke glow engine. Using these mounts with larger engines is not recommended. Larger engines should use an aluminum mount. A wide variety of aluminum after-market mounts are available and should work well on this airplane if you choose.

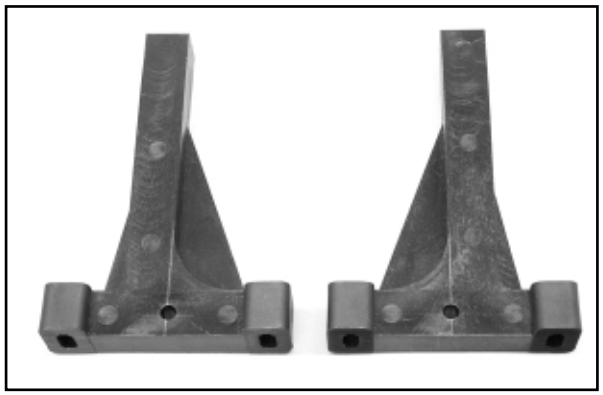
❑ 1) Horizontal and vertical engine centerline marks are scribed on the front of the firewall. Use a straightedge and pencil to extend the horizontal and vertical centerlines to the edges of the firewall.

❑ 2) Measure the width of your engine's crankcase, at the mounting lugs. (example: an Irvine 1.50 2-stroke has a case width of 2.03" between the mounting lugs, while a Saito 1.50 4-stroke measures 1.80" between the lugs.). Divide the case width measurement by 2 and draw lines on the firewall on each side of the horizontal centerline at that distance. These lines should be exactly parallel to the horizontal center line. These lines indicate where the inside edge of the engine mounts should be to fit your engine.



❑ 3) Hold a straight-edge up tight against the engine bearing surface of each engine mount, and then use a sharp pencil to draw the thrust line location onto the side of the mounts. Be precise!

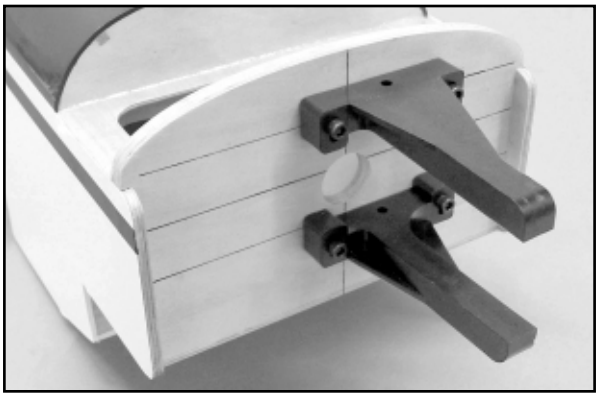




❑ 4) One at a time, hold the engine mounts in place on the firewall, lining up the pencil mark with the vertical centerline on the firewall, while at the same time aligning the inside edge of the mount with the case width marks you drew on the firewall in step 2. When you have the mount properly aligned and square, carefully mark the engine mount's bolt hole locations onto the firewall with a pencil. Note that the holes in the engine mounts are slotted. Make your mark in the middle of the slot, which will allow for small adjustments of the final space between the mounts later.

❑ 5) Use a 3/16" dia. bit to drill the four holes in the firewall for the motor mounts. After all four holes are drilled, change drill bits to a 1/4" dia. and redrill the four holes to allow clearance for the 10-32 blind nuts.

❑ 6) Bolt the engine mounts in place on the front of the firewall using the four 10-32 x 1" Socket-Head Bolts, four 10-32 Blind Nuts, and four #10 Flat Metal Washers provided. Tighten the bolts until the prongs of the blind nuts are sunk securely into the back of the firewall. Apply some epoxy glue around the flanges of the blind nuts to keep the nuts from coming loose. Be careful not to get any glue in the threads of the blind nuts.



❑ 7) With the engine mounts bolted on the firewall, place your engine on the mounts. Move the engine forward or backward on the mounts until you measure exactly 6" from the front face of the prop drive washer to the front of the firewall. This is the distance your engine needs to be from the firewall for proper cowl alignment and prop clearance purposes. Accurately mark the engine's mounting bolt hole locations onto the engine mounts and then remove the engine.

❑ 8) This kit does NOT contain bolts for mounting the engine to the engine mounts. That is because not all 1.20-1.50 size engines use the same size. The diameter of the bolts you need depends on the size of the holes in your engine's mounting lugs. Some engines may need 8-32 size bolts, while others may need 10-32. You will need to go to the hobby shop to obtain the correct size for your engine.

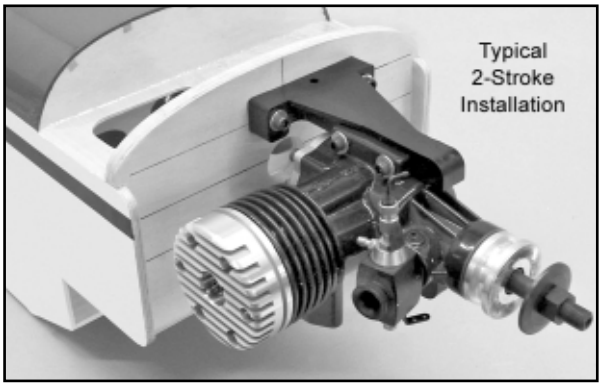
IMPORTANT SAFETY ISSUE!

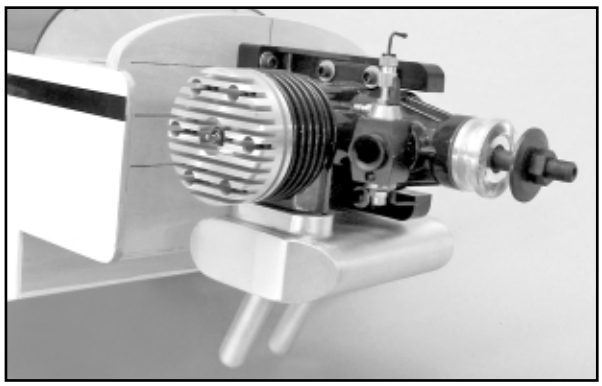
Use only steel Socket-Head Bolts with Aircraft Lock Nuts and Flat Metal Washers to fasten your engine to the glass-filled engine mounts. The holes you drill through the mounts must be big enough for the bolts to pass freely through. They should not go in tight.

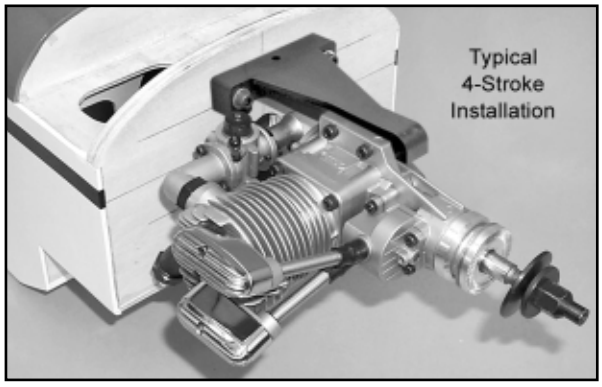
DO NOT DRILL AND TAP THE GLASS-FILLED MOUNTS FOR BOLTS, OR USE SELF-TAPPING SCREWS OR WOOD SCREWS. THOSE METHODS WILL WEAKEN THE MOUNTS AND CAN LEAD TO MOUNT FAILURE!

Drill the four mounting holes in the engine mounts, being very careful to drill them perpendicular to the mount. Use a drill press if available. These holes must be clearance holes, which allow the bolts to slip through. In the case of 8-32 bolts, an 11/64" dia. drill bit will provide clearance holes. For 10-32 bolts use a 13/64" bit.

After drilling the holes, mount the engine in place to the engine mounts. We suggest using a little thread locking compound (Loctite®) on the bolt threads to keep them from coming loose.







MOUNTING THE COWL

Before mounting the cowl, carefully inspect its inside rear edges. Use sandpaper to smooth the inside rear surface of the cowl, making it free of any bumps or ragged edges that may scratch or dent the fuselage when pressed in place. Also make sure the four mounting holes are open and free of any debris.

❑ 1) Slide the fiberglass cowl in place over the engine and back onto the fuselage. Watch carefully to see if the cowling is going to clear your engine installation. Engines at the larger end of the recommended size range (like the Irvine 1.50 shown here) will need to have an opening made in the side of the cowl to clear the head of the engine. As a general rule, you should have at least 3/16" clearance from the cowl to any engine part. This is largely a matter of carefully observing where the engine part is contacting the cowl and then marking that location on the cowl with a felt marker. Remove the cowl, and use a Dremel® Tool to make a small hole in the cowl at the point of contact. Refit the cowl, checking the hole location and size, adjust as needed and again use the Dremel® Tool to work on the opening. This method is referred to as "sneaking up" on the opening, to make a perfect clearance hole. A handy tool for this job is a small penlight. The penlight can be used from the inside or outside of the cowl to highlight and spot required hole locations.

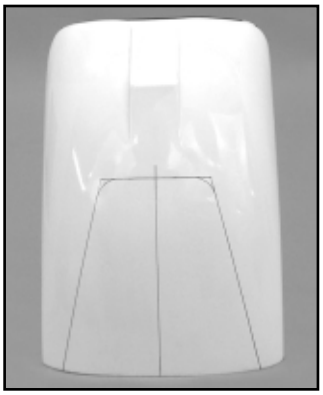
❑ 2) Once the cowling is in place without any part of the engine contacting it, push the cowl back onto the fuselage until the engine prop mounting flange emerges from the front of the cowl. This flange must clear the front of the cowl by at least 1/16" (1/16" to 1/8" is OK). Slip the spinner backplate in place over the engine prop shaft, pushing it all the way back to the prop mounting flange. Mount a prop or prop stub "dummy" in place on the drive shaft. Tighten the prop assembly sufficiently to bring the spinner backplate firmly in place against the prop mounting flange. Recheck to make sure you have at least a 1/16" gap between the back of the spinner backplate and the front of the cowl. Center the spinner backplate to the cowl and use masking tape to secure the back of the cowl to the fuselage, leaving the four pre-drilled mounting holes along the back edge of the cowling uncovered.

❑ 3) With the cowl securely taped in place, use a 3/64" (or #56) dia. drill bit to drill pilot holes in the fuselage, centered in each of the four pre-drilled mounting holes in the cowl. Mount the cowl to the fuselage with four M2.6 x 10mm PWA Screws provided. Double check your work one more time to make sure that the cowl is bolted on in the correct location and alignment. Then remove the cowling from the fuselage.

❑ 4) An opening must now be made in the bottom of the cowling to allow engine cooling air to properly flow through and exit the cowling. This is absolutely necessary for proper cooling! Without this opening, your engine will overheat and quit. If you are using a 2-stroke engine, such as the Irvine 1.20 or 1.50, or a 4-stroke such as the Saito 1.20, 1.50, or the 1.80, we suggest using an opening which measures 6-1/2" long from front to back, 6-1/2" wide at the back edge by 3-1/2" wide at the front. This size opening allows the exhaust pipes on the recommended SIG muffler for the Irvine engines to clear the cowl with plenty of additional air exit area, as well as allowing plenty of air for 4-stroke engines. The dimensions of this opening may certainly be “customized" for your particular engine/muffler set-up, as long as there is sufficient air exit area.

Stand the cowl upright on its rear edge, nose up, with the bottom side facing you. Use a fine-point marker pen to draw an outline of the area you need to cut out. Measure carefully to make sure that the opening is properly centered and located. We suggest using a circle guide to round the two upper corners of the cut out area for a better look.

The air outlet can be easily cut from the fiberglass cowl using a Dremel® Tool and a large cut-off wheel. Before cutting out the cowl opening be sure to wear safety glasses and a mask of some kind to avoid inhaling any fiberglass dust. Carefully cut the fiberglass, using the lines previously drawn. If you are careful, you will find that you can get fairly close to the lines with the cut-off wheel. The goal is to remove most of the material within the lines. Once the piece is cut and removed, exchange the cut-off cut-off wheel for a sanding drum bit in your Dremel® Tool. Use the drum sander bit to round the upper two corners and to lightly clean up any jagged edges. Use 220 sandpaper to clean up the edges of the cutout, without sanding the paint. Make sure the edges are uniform and free of any loose glass. Remove all fiberglass dust from the cowl with tack rag or with alcohol on a clean cloth.



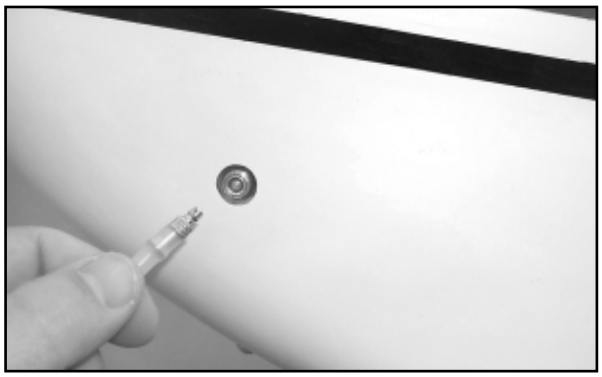
❑ 5) Mount the trimmed cowl back onto the fuselage. In this step you will determine the location for the hole required for access to your engine's needle valve. This is easiest done using the penlight mentioned earlier in step #1 and fine-tip marker pen. First find the approximate location of where the needle valve will exit by looking carefully at your engine carburetor. Mark that location on the cowl.

Now look a little closer and use the penlight to adjust the mark just made from the outside of the cowl. Reposition the mark as required to get as close as possible to the exact needle valve location. Use the Dremel® Tool and a small tipped grinding bit to make a small hole (maybe 1/16" in diameter) in the cowl, at the exit mark just made. Chances are that you were quite close to the actual exit point. Stick a piece of music wire into the hole, down to the needle valve. Carefully observe if the hole needs to be repositioned to straighten up the wire, as if it were the needle valve. Make another mark on the cowl and again use the Dremel® Tool to open the hole just a little towards the correct position. In this manner, continue checking and adjusting the exit hole until it aligns

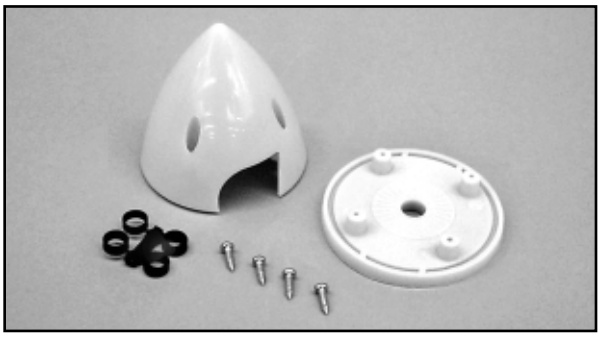
perfectly with the carburetor/needle valve position. Use the Dremel® Tool and tapered bit to open the hole enough to insert and install the needle valve in the carb. Be sure the hole has at least 3/32" clearance around the needle valve to avoid contact.

❑ 6) **OPTIONAL:** You must be able to fuel and de-fuel your EXTRA conveniently. There are several commercially available fueling systems that would work with this model. We have used and highly recommend the Du-Bro #334 Kwik-Fill Fueling Valve for glow engines. In this optional step, we will explain how we mounted our fueling valve. All that's required is to make a simple 90° aluminum bracket to hold the valve, mount it to the firewall, and then make a small hole in the cowl to accept the fuel probe. We mounted our filler bracket near the left edge of the firewall. Our bracket was made from K&S 1/16" thick aluminum sheet. Drill one end of the bracket with a 3/8" dia. hole to accept the fuel valve body and drill two 7/64" dia. holes at the other end, allowing it to be mounted in place with two #4 sheet metal screws (not supplied). Mount the bracket in a position that will put the valve as close as possible to the cowl but not contacting it.

A small hole must be made in the cowl, directly over the fuel valve, to allow the fueling probe to be inserted into the valve. Place your penlight behind the bracket, at the hole for the filler valve. You can now clearly see exactly where the hole must be on the outside of the cowl. Mark this location with a marker pen, remove the cowl and use the Dremel® Tool and a tapered bit to open up a hole about 5/16" in diameter at the mark made earlier. Put the cowl back on and check your work. Adjust the hole as needed to allow easy insertion and removal of the fuel probe.



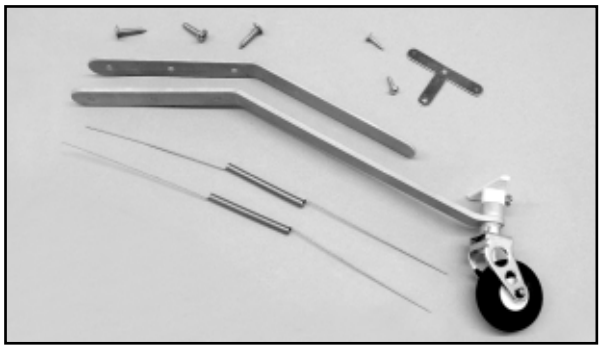
❑ 7) With the engine and cowl mounted in place, the spinner can now be fitted to the engine. The spinner supplied in this kit has been molded to accept APC propellers up to 16 x 8 in size. The shaft hole in the spinner backplate must be made to fit your particular engine. If your engine shaft is smaller than the hole in the spinner backplate, plastic prop shaft adapters are included to correct the problem. If your engine shaft is larger than the hole in the spinner, it can be drilled to fit. This should be done using a drill press. Once you've adapted the backplate to your engine shaft, slip the backplate onto the engine. Slip the propeller onto the shaft and secure it with your engine's nut and washer. Snap the spinner nose cone in place into the base plate channels and use the four mounting screws supplied with the spinner to mount it to the backplate. Don't over-tighten the screws but bring them up snug.

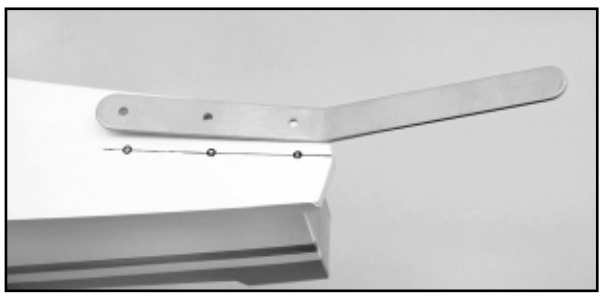


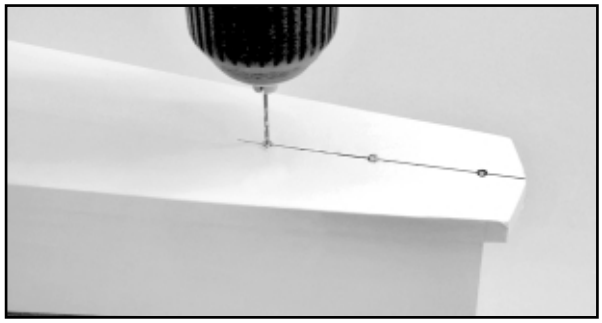
LANDING GEAR ATTACHMENT

❑ 1) Mount the formed aluminum main landing gear in place on the fuselage using the three M4 x 15mm PWA Bolts provided. Note that blind nuts have already been pre-installed inside the fuselage for these bolts.

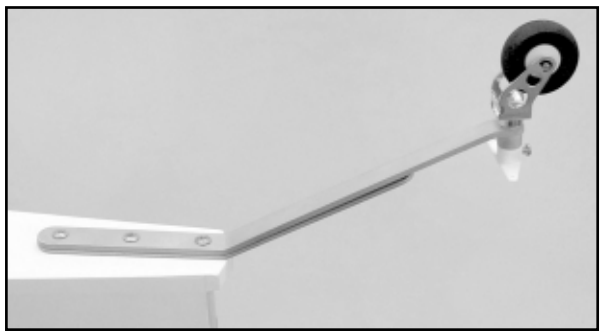
❑ 2) Locate the bag containing the tailwheel assembly. Hold the short leaf spring in place on the fuselage. Make sure it is lined up with the fuselage centerline, and that it is as far back as shown in the pictures. Use a fine-tip marker pen to mark the locations of the 3 mounting holes onto the fuselage. Drill the holes through the bottom of the fuselage with a 1/16" dia. drill bit.







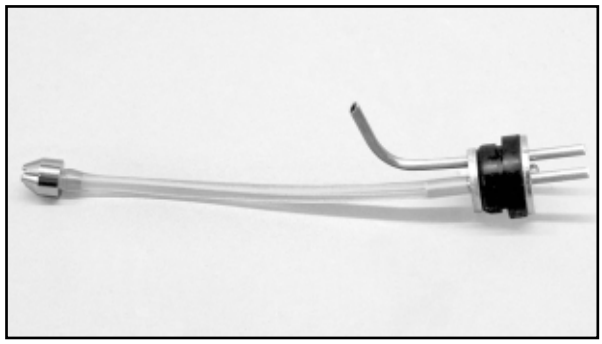
❑ 2) Fasten both leaf springs of the tailwheel assembly to the bottom of the fuselage with the M3 x 14mm PWA Screws.

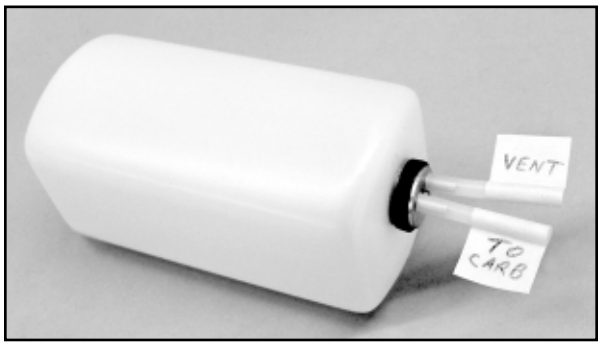


❑ 3) The tailwheel's coiled steering springs will be installed later, after the fin and rudder are attached to the fuselage.

FUEL TANK

❑ 1) Assemble the fuel tank as shown. Be sure to label the "vent" and "carb" lines for later identification.

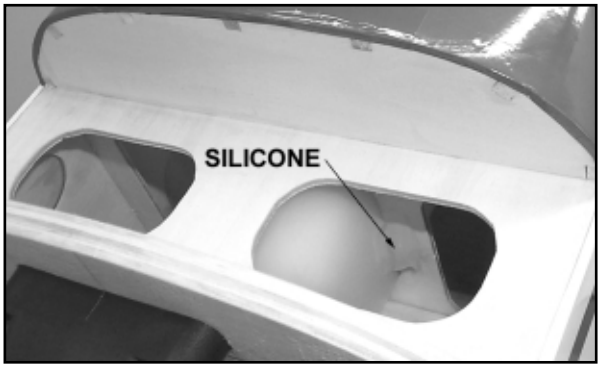




❑ 2) Trial fit the tank in place into the front of the fuselage to familiarize yourself with how it mounts. The front of the tank should fit through the hole in the firewall. The main body of the tank is supported by the contoured hole in the fuselage former. Take the tank back out of the fuselage.

❑ 3) Apply a bead of silicon adhesive around the neck of the tank, where it will contact the inside of the firewall. Put another big blob of silicone on the front of the tank just below the neck. Slide the tank in place into the fuselage, pushing it in until the neck goes into the hole in the firewall. Do not push it all the way up tight against the firewall. Leave it about 1/8" short. The blob of silicone on the front of the tank will act as a spacer and cushion between the tank and the firewall after it dries. It will also keep the tank away from the ends of the engine mounting bolts that may be protruding slightly past the back of the firewall.

❑ 4) Now, working through the opening in the top of the nose, run a small bead of silicone seal on each side of the tank body where it contacts the fuselage former. The will keep the tank from sliding backwards in flight. If the tank ever has to be removed for service, you can cut the silicone loose and get the tank out.



THROTTLE PUSHROD

The following instructions describe installation of the throttle pushrod materials that are included in this kit. This pushrod system should be adaptable to almost any typical 2-stroke R/C glow engine, like the Irvine 1.50 shown in the photos. Gas engines and 4-stroke engines may require a different pushrod arrangement and different materials (not supplied).

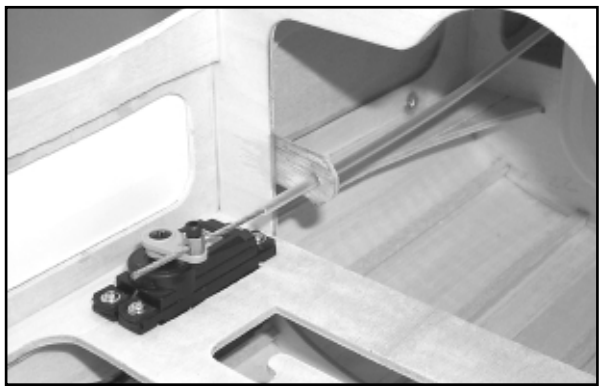
❑ 1) Two throttle servo cutouts are provided in the plywood tray built into the fuselage, one on each side. Use the side that best suits the throttle arm on your engine. Mount your throttle servo in the plywood tray, using the grommets and mounting screws supplied with your radio system.

❑ 2) Locate the 1/8" od x 18" Nylon Pushrod Tubing, the 1/16" x 18" Stranded Steel Cable, the 1/8" x 5/8" x 1-1/4" plywood Throttle Tube Support (has one rounded end with a hole for the tube), the Pushrod Connector assembly (hex brass body, nylon retainer, and 4-40 x 1/8" socket-head bolt) and the 2-56 Solder Link.

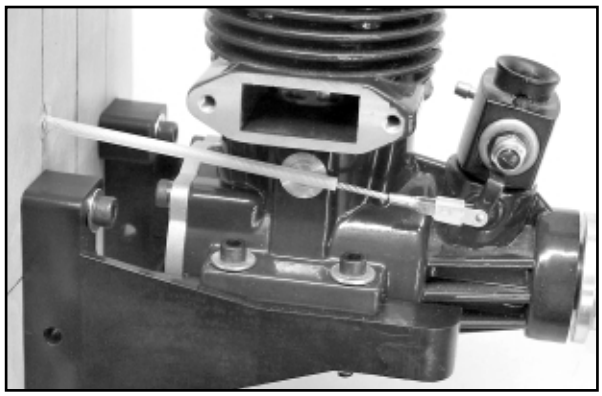
❑ 3) Drill a 9/64" dia. hole through the firewall, aligned with your engine's carburetor throttle arm. From the front, insert the 1/8" nylon pushrod tube through the firewall and into the fuselage, leaving about 3" of tube sticking out in front of the firewall (typical when using a 1.20 or 1.50 2-stroke engine).

❑ 4) Inside the fuselage, slip the plywood throttle tube support over the end of the nylon pushrod tube and up against the forward fuselage former. Position the plywood support so that it aims the nylon tube directly at the throttle servo's output arm. Then glue the plywood support to the former in that location.

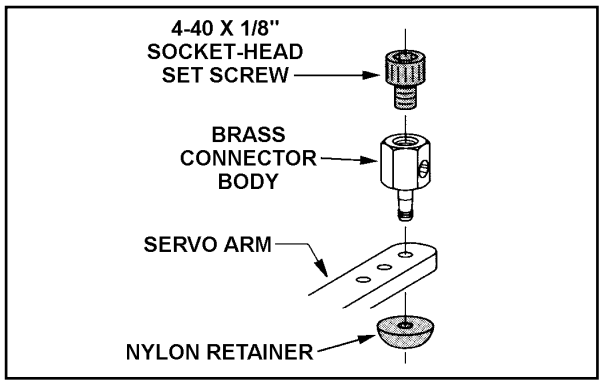
❑ 5) Use a sharp razor blade to cut the nylon tube to length 1" beyond the plywood tube support. Remove the tube and sand its surface with 220 sandpaper to rough it a little. Reinstall the tube and glue it in place to the firewall and the plywood tube support with thick CA glue.



❑ 6) Solder the 2-56 solder link to one end of the steel cable - this is the carburetor end of the throttle pushrod. In addition to attaching the solder link to the end of the cable, you should flow some solder into the last 1" to 2" of cable (depending on your specific installation) to stiffen it. Also flow solder into the last 1" of the other end of the cable to stiffen it and keep it from unraveling.

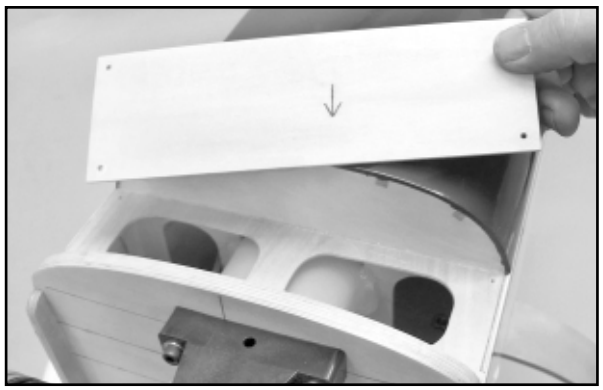


❑ 7) Install the brass pushrod connector assembly to the output arm on the throttle servo, as shown in the drawing.



❑ 8) From the firewall, insert the bare end of the steel cable through the nylon tube. When you get it all the way in, insert the end of the cable into the pushrod connector on the servo. At the other end, connect the solder link to your engine's throttle arm. Finally cut the cable to length inside the fuselage, leaving about 2" of extra length behind the brass pushrod connector. The extra length will be useful when setting up the throttle travel limits later on.

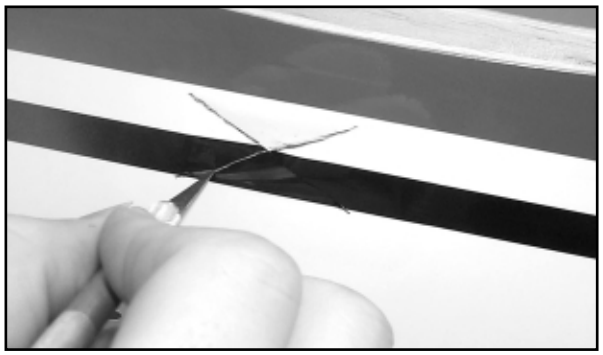
❑ 9) Fit the 1/8" x 2-9/16" x 7-7/8" plywood front fuselage hatch onto the nose of the airplane. Hold the hatch in place while you drill a 3/64" (or #56) dia. hole through each corner of the hatch and on down through the fuselage plywood. Take the hatch off and open up the holes in the hatch to 7/64"" dia., to allow clearance for the screws. Screw the hatch in place with the M2.6 x 10mm PWA screws provided.

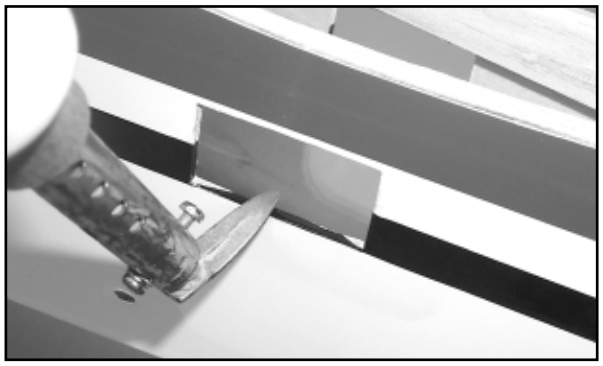


ADDITIONAL FUEL PROOFING: *It's a good idea to paint the hatch, firewall and bare wood areas of the nose with a fuel-proof paint such as clear dope, epoxy, enamel, or similar. A light coat of fuel-proofer has been applied at the factory, but another coat will increase the life of the model and treat the newly exposed wood areas that you have drilled and/or cut out.*

ATTACHING THE TAIL SURFACES

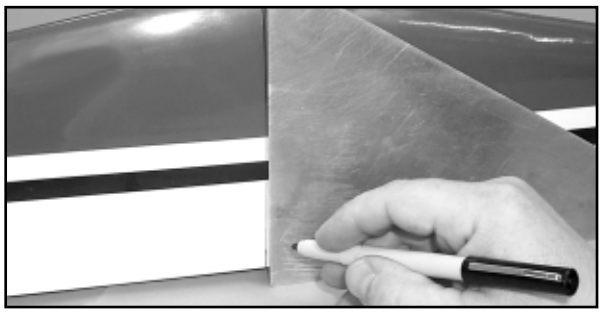
❑ 1) Use a sharp #11 blade to open up the covering material over the two elevator servo cutouts at the rear of the fuselage. Use a trim seal iron to tack the loose covering around into these cutouts. Trim and remove the excess covering material.



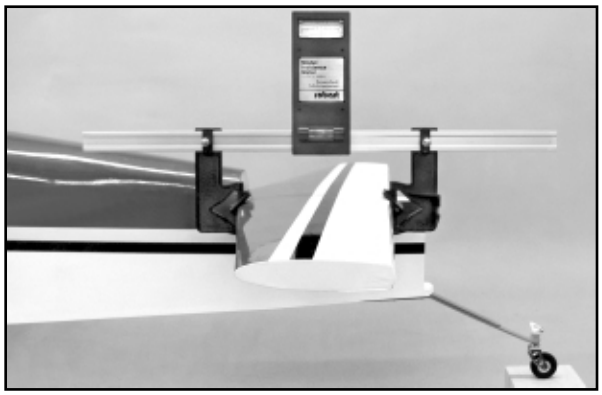


NOTE: Accurate alignment is ultra critical to the performance of an aerobatic airplane like the EXTRA. For that reason, we recommend that you buy or borrow an accurate "incidence meter" (like a Robart® Incidence Meter) to help with the final alignment of the tail surfaces during the next steps.

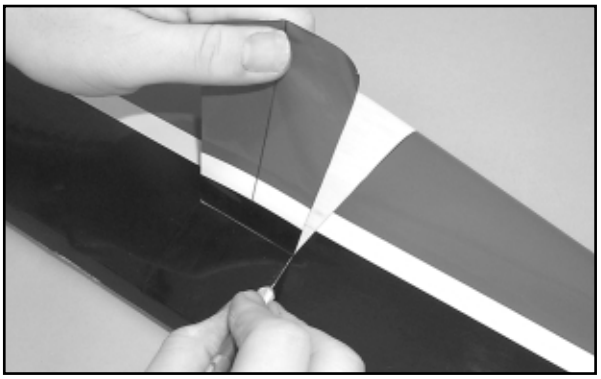
❑ 2) Use a ruler to find the exact center of the stabilizer at the trailing edge, marking the location with a felt-tip pen. Use a 90° triangle to draw a centerline on the stab at this location.



❑ 3) Bolt the wing in place on the fuselage. Attach an incidence meter to the leading and trailing edges of the wing, near the fuselage. Then prop up the rear of the fuselage until it is level according to the meter, reading 0°. Place the stabilizer in its saddle in the fuselage and use pins to hold it in place. With the stab in this position, carefully remove the incidence meter from the wing and attach it to the stabilizer, without jarring the position of the airplane. Ideally the meter will again read 0°. If it does not, then the stab saddle in the fuselage must be adjusted to seat the stab at 0°. Use a sanding block to adjust the stab saddle as needed.

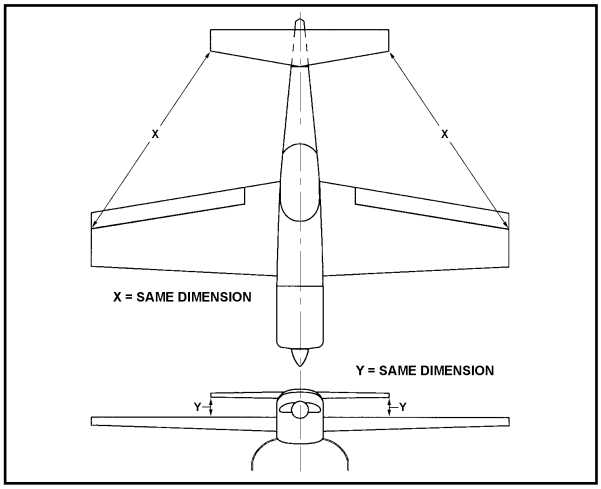


❑ 4) With the stabilizer in correct alignment on the fuselage, use a felt-tip pen to mark the location of the fuselage sides on the bottom of the stab. Then remove the stabilizer and use a sharp blade to carefully remove the covering material just inside of these two lines, including where it contacts the fuselage at its leading and trailing edges. **BE VERY CAREFUL NOT TO CUT INTO THE BALSA WOOD!**

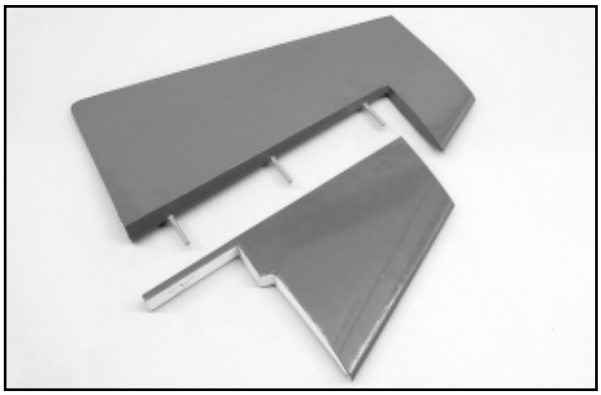


❑ 5) There's one more thing to do before gluing the stabilizer onto the fuselage! That is preparing the stab and elevators for hinging. It's a lot easier to do it now while you can still hold the individual parts in your hands. Refer back to step 7 of the **WING ASSEMBLY** (on page 5) for step-by-step guidance on installing hinges. Note that there are 3 hinges per elevator. Go ahead and permanently glue the hinges into the elevators at this point, but not into the stabilizer. Let dry.

❑ 6) The stabilizer can now be glued permanently in place on the fuselage. Use slow-drying epoxy glue for this step. First apply glue to the stab saddle area of the fuselage and then place the stab squarely in position - use a weight to hold it in position. View the airplane from the top, front and rear, making sure the stab is square, without leaning one way or the other. Use a ruler to measure from the outer trailing edge wingtip back to the stab's leading edge tip and note the measurement and repeat this process on the opposite side. The two measurements should be the same. Make adjustments as needed. Tape and/or weight the stab firmly in place to the fuselage, wipe off any excess glue with alcohol and allow the glue to set. Remove the wing from the fuselage.



❑ 7) Prepare the fin and rudder for hinging. Note that there are 3 hinges in the fin/rudder. Go ahead and glue the hinges in the rudder at this point, but not into the fin. Let dry.

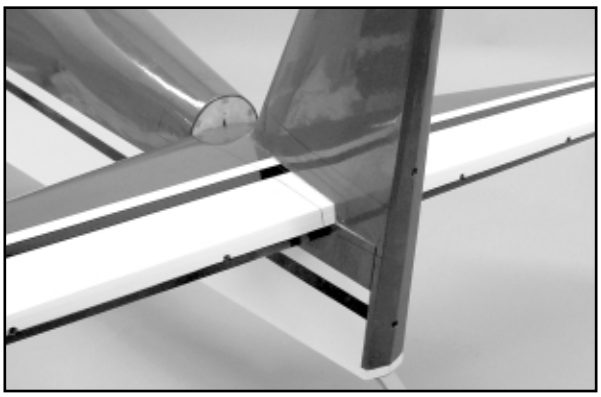


❑ 8) Trial fit the fin in place on the fuse. The bottom of the fin should sit on top of the stabilizer without any big gaps.

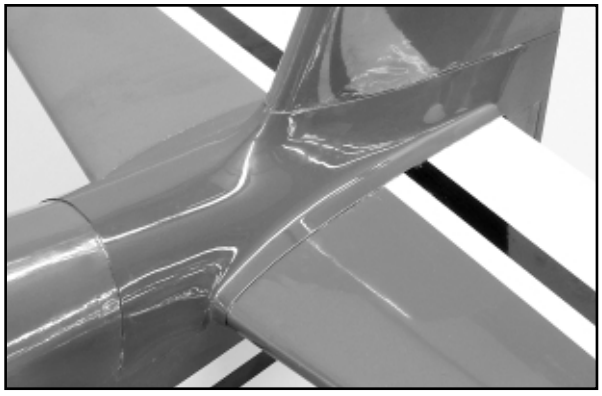
a. View and measure the alignment of the stabilizer to the entire airplane from several different angles. Make sure that the fin is absolutely 90° upright on the fuselage, and that it is aligned straight with the centerline of the fuselage, not turned left or right.

b. When satisfied with the alignment, use a felt-tip pen to mark the fin location on top of the stab. Take the fin off and carefully remove the covering material from the stab just inside of the lines.

c. Apply slow-drying epoxy glue to all the mating surfaces, and then put the fin back in place on the fuselage. Wipe off any excess glue with alcohol. Recheck the alignment, adjust as needed, and then let dry.



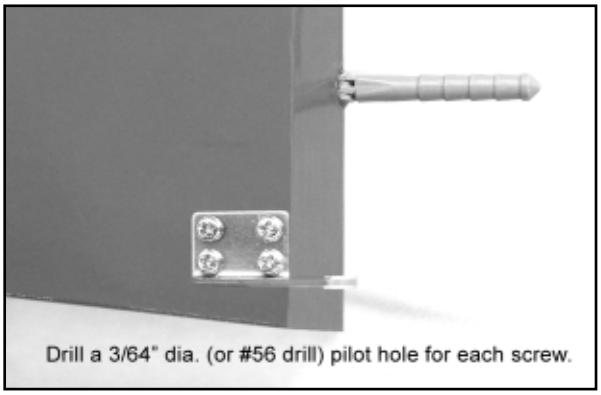
❑ 9) Locate the molded plastic tail fairing. Trial fit the fairing in place onto the fuselage. Trim as needed to seat the fairing in contact with the fuse, the top of the stab and around the fin. Once satisfied with the fit, mark the location of the fairing onto the fuse, stab and fin with a felt-tip pen. Remove the fairing. Use a sharp #11 blade to cut away the covering just inside of the lines, exposing the wood. Apply a coat of glue to the inside of the fairing where it will contact these areas. Install the fairing, pressing it firmly in place to make sure it contacts all gluing areas. Clean up any excess glue with alcohol and use tape to secure the fairing in place. Allow to dry.

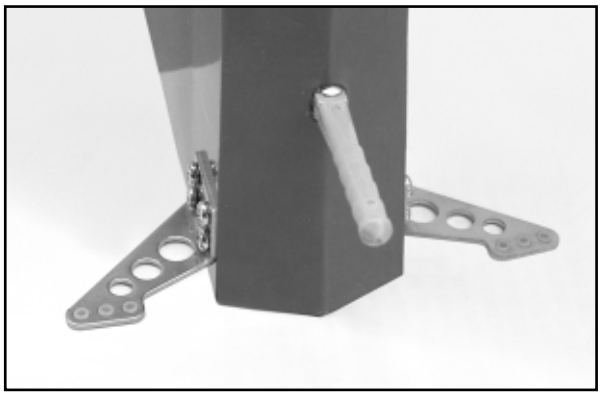


❑10) Mount the rudder servo in the center servo cutout in the fuselage, using the grommets and screws supplied with your radio system.

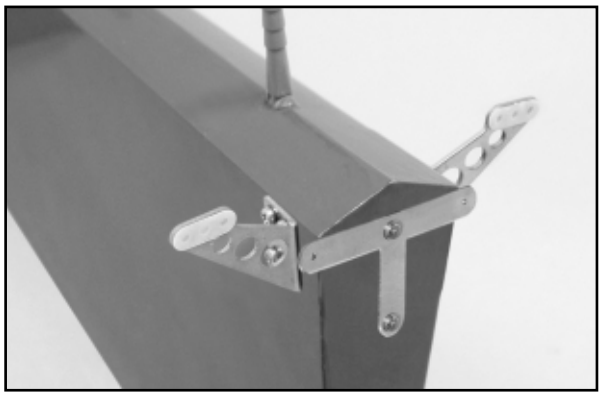
❑11) Locate one left and one right Metal Control Horn and eight M2.6 x 10mm Metal Screws. Mount the control horns near the bottom of the rudder, as shown in the next 2 photos. Notice that the control horns should be as far forward as possible, up against the front edge of the rudder, so that the pivot holes in the control horns will line up with the hinge line. Also make sure that horns are directly opposite one another on each side of the rudder.

IMPORTANT: After you finish mounting the control horns on the rudder for the first time, take them back off and set them aside temporarily. Then put a few drops of Thin CA into each of the screw holes in the rudder. The Thin CA will soak into the threads in the wood, and when it dries the holding power of the threads will be much stronger. Use Thin CA only, not medium or thick CA. Let the Thin CA dry completely before remounting the control horns onto the rudder.





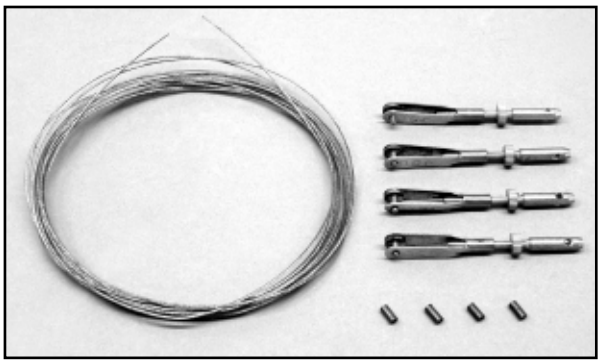
❑12) Mount the T-shaped Metal Rudder Horn onto the bottom of the rudder with two M2 x 9mm PWA Screws, as shown here.



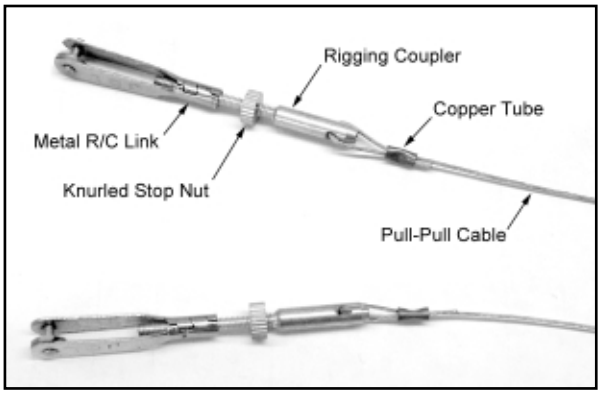
❑13) Hinge the rudder to the fin with epoxy glue. Clean off any excess glue and allow to dry.

❑14) The rudder pull-pull system can now be installed. From the kit contents, locate the coil of Steel Cable, 4 Copper Swage Tubes, 4 Threaded Rigging Couplers, and 4 Metal R/C Links.

a. Cut the braided cable in half, into two equal lengths. A heavy-duty scissors works well for cutting the cable.



b. Slide one of the copper swage tubes onto the end of one of the pieces of cable. Then thread the end of the cable through the small hole in the end of the threaded rigging coupler, giving yourself about 4" - 5" of cable past the hole to work with. Loop the short end of the cable back and run it back through the copper tube. Pull the tube up to the rigging coupler, about 1/2" away from it. Use pliers or a crimping tool to squeeze the copper tube tightly over the cable, locking it in place. Cut off the excess short end of the cable. Thread an R/C link onto the rigging coupler, centering it on the threads. Repeat this process to make the same type of end on the other piece of cable.



c. The two cable ends prepared in the last step will be located at the rudder. Feed the bare end of the cables into the pull-pull exits built into the rear of the fuselage. Pass the cable ends completely through the rear of the fuselage and up to the rudder servo location. Keep pulling the cables forward until you can connect the R/C links to the rudder control horns.

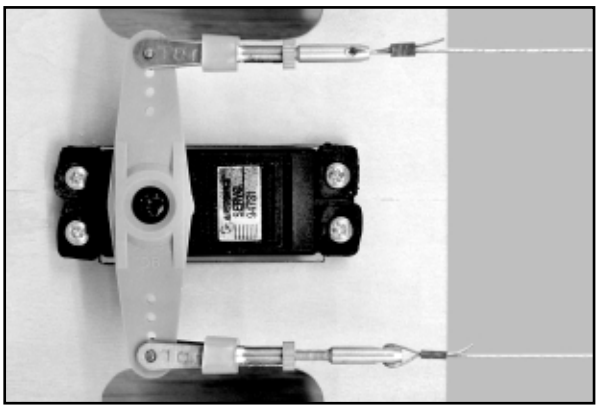
❑15) Turn the fuselage upside down on your bench to make it easier to complete the pull-pull cable connections to the rudder servo.

a. Install a heavy-duty 2-sided servo output arm onto the rudder servo. Turn on your radio system to center the rudder servo.

b. Temporarily tape the rudder in neutral alignment with the fin.

c. Thread the remaining 2 R/C links onto the remaining 2 rigging couplers. Be sure to center the R/C links on the threads of the rigging couplers. Clip the units in the outermost holes on each side of the rudder servo arm.

d. Slide a copper swage tube onto the bare end of one of the pull-pull cables inside the fuselage. Poke the end of the cable through the small hole in the end of the rigging coupler. Make a half loop back into and through the copper tube. Pull the cable snug to remove any slack (not tight) as you slide the copper tube up close to the output arm. Crimp the tubing tightly over the cable, locking it in place. Cut off the excess short end of the cable. Repeat the process to complete the remaining cable on the opposite side of the servo output arm.



e. With the rudder still taped in neutral, adjust the threaded R/C links until you get both pull-pull cables to approximately the same mild tension - it's not necessary to pull the cables extremely tight.

f. Remove the tape holding the rudder in place, turn on the transmitter and test the movement and centering of the rudder. Adjust as needed.

g. When satisfied with the operation of the pull-pull system, tighten the knurled stop nut on each rigging coupler up against the end of the R/C links to lock the links in place.

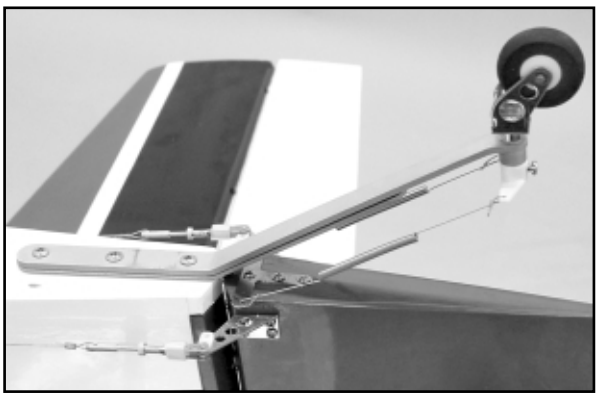
IMPORTANT SAFETY ISSUE: You may have noticed in the last picture that we installed a short length of fuel line tubing over each R/C link, as insurance against the link popping open and coming off in flight. It's a good idea to do this to all the R/C links you use in all of your models.

❑ 16) The two Coiled Steering Springs can now be installed on the tailwheel, connecting the tailwheel's steering arm to the T-shaped metal horn mounted on the bottom of the rudder.

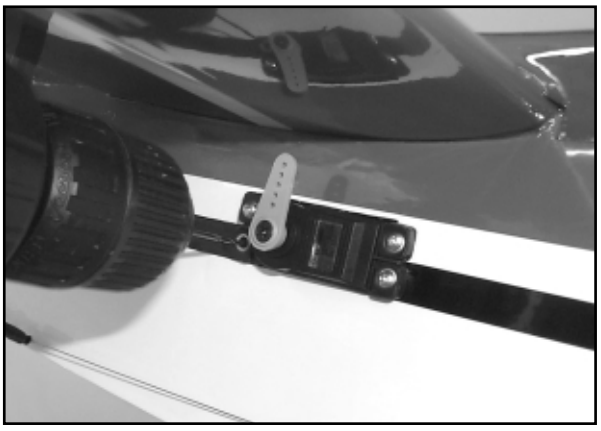
a. Use needle nose pliers to bend loops in one end of each spring to hook into the holes of the T-shaped rudder horn.

b. With the rudder and tailwheel both in neutral position, apply a small amount of tension to the spring and use the pliers to make a 90° bend at the tailwheel steering arm hole. Insert the wire into the steering arm and make another 90° bend back toward the center of the spring, forming a loop. Do the same for the other spring. Do not over stretch the springs when doing this. A little bit of tension is all you need.

c. Turn on your radio system to check the movement of the rudder and tailwheel. If there is binding, correct it. The springs should center the tailwheel to the rudder when it is at neutral.



❑17) Mount the two elevator servos in the fuselage now, using the rubber grommets and screws that were supplied with your radio system. When done, temporarily unscrew the elevator servos so you can install the radio "Y-harness" chord in the next step.



❑18) As mentioned earlier, to make the elevator servos function properly you will need to either;

(a) electronically reverse one of the elevator servos internally and use a standard Y-harness, or

(b) use the " MIRACLE Y™ Servo Reversing Y Adapter" to obtain mirror image elevator action

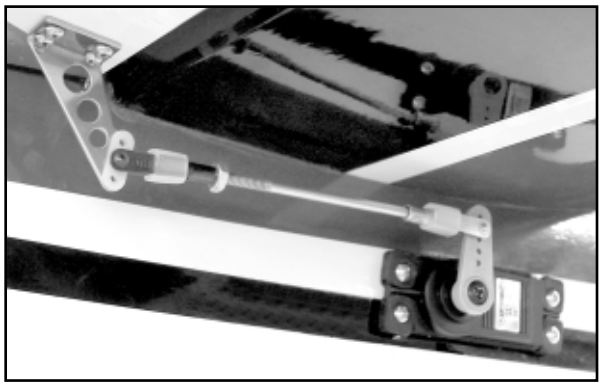
Install your Y-harness chord through the canopy opening, back to the two elevator servo cutouts. To avoid a clutter of chords and to keep them away from the pull-pull cables, route the y-harness chord through the upper part of the rear fuselage. Plug the elevator servos into the Y-harness ends at the servo cutouts, securing all connector plugs with tape. Then reinstall both elevator servos, pulling the excess chord lengths towards the front. Use plastic "cable ties" or small spots of silicone adhesive to lightly fasten the extension chords (or the " MIRACLE Y™" control pot) in place to the model structure, to keep them from flopping around during flight and possibly coming unplugged. Finally, plug the chord into your radio system to check the action of the elevator servos. Make any corrections that may be required.

❑19) Hinge the elevators to the stabilizer at this time. Be careful to correctly identify which elevator goes on the right side and which goes on the left. Look for the plywood mounting pads that are inset into the BOTTOM side of each elevator, underneath the covering. After installing the hinges, wipe off all excess glue from the hinge line with alcohol, and then tape the elevators to the stabilizer in neutral position and allow to dry.

❑20) After the hinges are dry, mount the control horns to the elevators. You will need the two remaining Metal Control Horns and eight M2.6 x 10mm Metal Screws. As mentioned, there are plywood mounting pads already inset in the bottom of the elevators, under the covering material. Hold the control horn in place on the elevator, lined up with the elevator servo output arm. Make sure the pivot holes in the control horn line up with the hinge line. Mark the control horn mounting holes on the elevator with a felt pen. Drill a 3.64” dia. (or #56 drill) pilot hole for each screw, then screw the horn in place. Repeat this procedure on the opposite elevator.

IMPORTANT: After mounting the elevator control horns for the first time, take them back off and set aside temporarily. Put a few drops of Thin CA into each of the screw holes in the elevator. The Thin CA will soak into the threads in the wood, increasing their holding power. Be sure to use Thin CA, not medium or thick CA. Let the Thin CA dry completely before remounting the control horns onto the elevators.

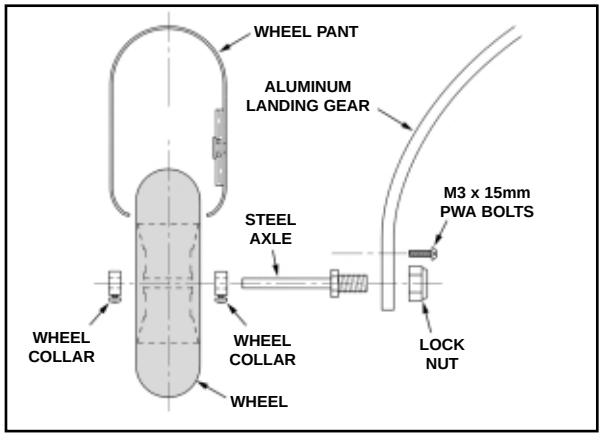
❑21) Locate the two 4-40 x 2-3/4" Threaded Pushrods for the elevator, plus two 4-40 Solder Links, two 4-40 Threaded R/C Links and two 4-40 Hex Nuts. Make two elevator pushrod assemblies by soldering a solder link onto the unthreaded ends of the pushrods. Thread a hex nut onto the threaded ends, followed by an R/C link. Use your radio to center the elevator servos and then mount the servo output arms in place at 90° upright. Tape the elevators to the stabilizer in neutral position. Attach the solder link ends of the elevator pushrods to the servo output arms. Adjust the threaded R/C links to fit into the middle hole of each elevator horn. Remove the tape holding the elevators in neutral and test the movement of the elevators with your radio. Adjust as required to get both elevators exactly at neutral (if you are using the "Miracle Y™" chord, you can turn the pot adjustment screw to achieve exact neutral very easily). Final elevator throw adjustments and locking the R/C links in place with the hex nuts will be made later.



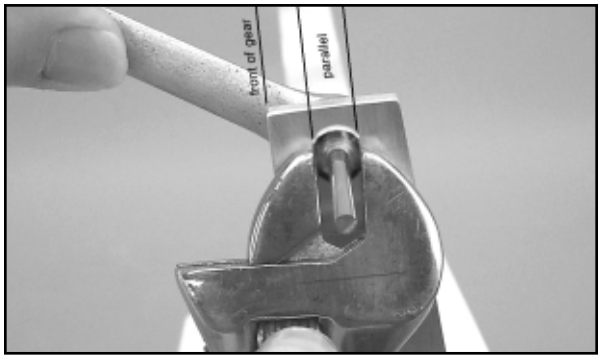
LANDING GEAR AND WHEEL PANT ASSEMBLY

NOTE: We suggest you use Loctite® threadlocking compound on all bolts used in the assembly of the landing gear.

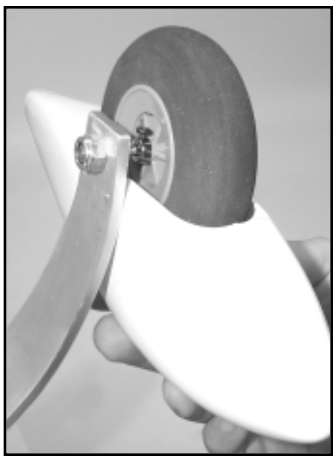
❑ 1) Locate the two fiberglass Wheel Pants, two Main Wheels, the two Steel Wheel Axles, two axle Lock Nuts, four Wheel Collars with Set Screws, and four M3 x 15mm PWA Bolts. Install the axles into the large holes at the bottom of each leg of the aluminum main landing gear. Thread the large lock nuts onto the threaded ends of the axles and tighten these securely.



Note: On the axle side of the gear leg, the two flat sides of the flange must end up parallel to the front of the landing gear, so that the notch in the wheel pant will fit over the flange properly.

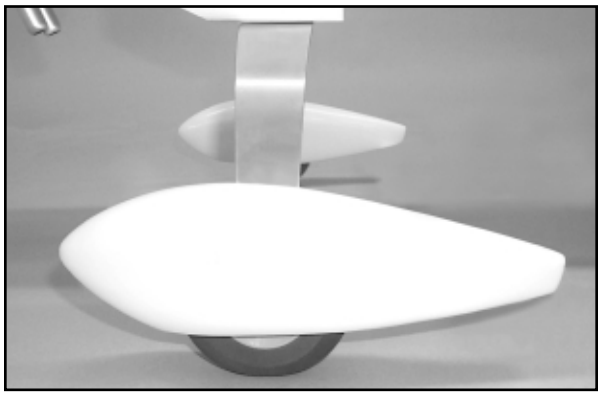


❑ 2) Slide a wheel collar onto the axle, followed by a main wheel, and then another wheel collar. Locate the outer wheel collar near the end of the axle and snug its set screw tight against the axle. Now slide the wheel and inner wheel collar out against the outer collar, and lightly tighten the inner collar set screw. Trial fit the fiberglass wheel pant in place over the wheel. If necessary, reposition the wheel collars to center the wheel in the pant opening. Then tighten both wheel collar set screws for good.



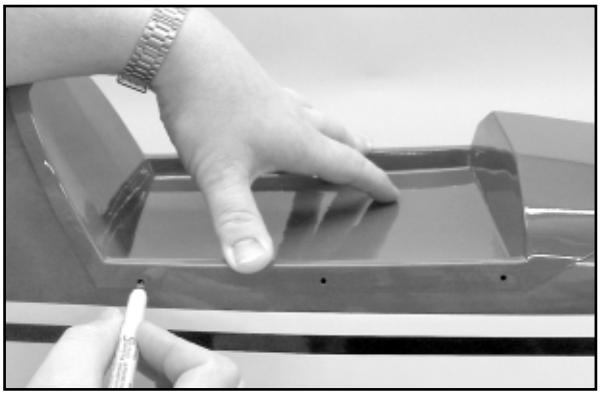
Helpful Tip: *Tighten all the wheel collar set screws with their heads pointing straight down. That way you will have easy access to the collars if adjustments ever become necessary.*

❑ 3) Mount the wheel pants to the landing gear with the M3 x 15mm PWA Bolts. Double check to see that the wheels are properly centered in the middle of the wheel pant openings. If necessary, adjust the two wheel collars to get the wheel centered. Also make sure that the wheels turn freely without obstruction.

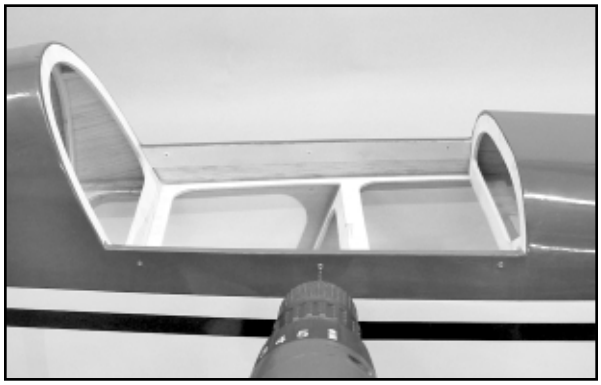


CANOPY ATTACHMENT

❑ 1) Notice that the molded plastic cockpit deck has 3 factory drilled holes along each side for the mounting screws. Set the cockpit deck in position on the fuselage. Use a felt-tip pen to mark the position of each mounting hole on both sides of the fuselage. Remove the cockpit deck.

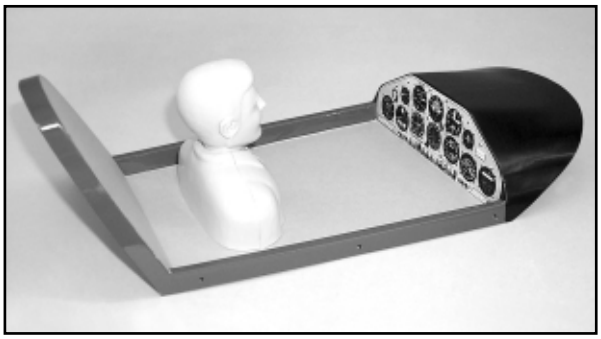


❑ 2) Carefully drill a 3/64" (or #56) dia. pilot hole at each marked location. Drill completely through the balsa and plywood cockpit sides.



❑ 3) Trial fit the cockpit deck back on the fuselage, using the M3 x 8mm PWA Screws provided to fasten it in place. If there are any problems with the fit of the cockpit deck to the fuselage, fix it at this point before proceeding.

❑ 4) **OPTIONAL STEP:** If you want to detail your cockpit deck, do it now. On our prototypes, we used light gray art paper to line the bottom and back of the cockpit deck, giving it depth and color. We measured and cut the paper to fit and applied it to the deck with a heavy coat of spray cement. The front portion of the cockpit deck (in front of the instrument panel) was masked off and painted with flat black enamel (from a hardware store spray can). A full-color printed paper EXTRA 300 instrument panel is included in this kit. Simply cut it out with a sharp scissors and use spray cement to glue it in place on the cockpit deck. Last, we mounted a 1/4 - scale civilian pilot figure to the cockpit deck to finish off the cockpit detailing. There are many brands of pilot figures available. No matter which brand you use, be sure to reinforce the bottom of the cockpit deck by epoxying a piece of scrap 1/32" or thicker scrap plywood underneath the area where the pilot will be mounted. This stiffens the cockpit deck and allows you to fasten the pilot to the base with screws.



❑ 5) a. Screw the cockpit deck back in place on the fuselage.

b. Use several pieces of masking tape to secure the cockpit deck to the fuselage, and then remove the screws.

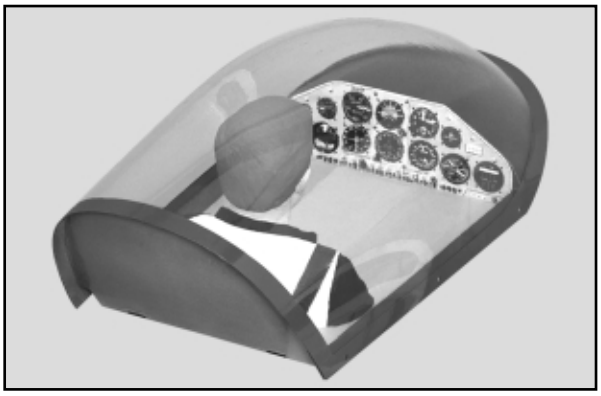
c. Set the clear plastic canopy in position on top of the cockpit deck. Check all around the edges to see how the clear canopy matches up to the cockpit deck. If the clear canopy hangs over the edge of the deck in some spots, trim off the excess clear canopy plastic with a sharp scissors or modeling knife as needed to achieve a good match.

d. Once you are satisfied, hold the clear canopy in exact position and use a felt-tip pen to mark the locations of the six mounting holes onto the canopy.

e. Remove the canopy and drill clearance holes at the marks with a 3mm (.018") or #31 (.020") drill bit.

f. Mount the cockpit deck and the clear canopy TOGETHER onto the fuselage with the six screws. Check the fit and make any final alterations.

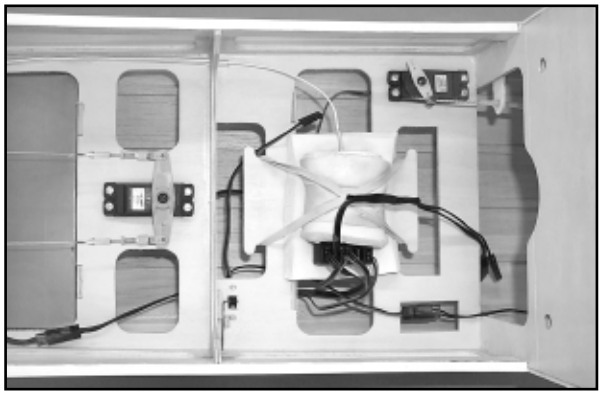
❑ 6) Unbolt the clear canopy and clean it with window cleaner. Dry it completely with a soft cloth and avoid handling the inside surface. Set it aside for a moment. Now use 220 grit sandpaper to lightly scuff the perimeter areas of the canopy base that actually contact the clear canopy. Wipe off excess dust with alcohol. Mix a small amount of epoxy glue and smear a thin layer of glue on the sanded area. Carefully place the clear canopy back on the canopy base and put the bolts back in. Use alcohol and a paper towel to wipe off any excess glue. If necessary, use some pieces of masking tape hold the clear canopy tight against the base and fuselage while the glue dries.



RADIO INSTALLATION
With all the servos now installed, all that remains is the installation of the receiver, battery pack and switch.

RX BATTERY PACK: The single heaviest unit of the radio system is the battery pack. This means that you can, if needed, locate the batteries wherever they are required in the airplane to help achieve the correct balance point. Be sure to wrap the battery pack in foam rubber and use rubber bands or tie-wraps to secure it to the model structure so that it can't move around in flight.

RECEIVER: Wrap the receiver in foam and use rubber bands or tie-wraps to secure it in the fuselage. Note that the EXTRA has an internal receiver antenna exit tube already installed inside the fuselage. It's the clear plastic tube running along the right side of the fuselage, extending from the radio tray all the way back through the fuselage, exiting just ahead of the tailwheel assembly on the bottom. Slide your antenna into this tube when installing your receiver.



SWITCH: The switch can be mounted onto the fuselage side or internally. We prefer an internally mounted switch. We mounted ours onto the radio tray, using a length of music wire to activate the switch from the outside. This is simple to do. Just drill a small diameter hole in the switch lever to fit a piece of .045 music wire. Drill an exit hole in the side of the fuselage, lined up with the switch/wire location. Make a 90° bend in one end of the wire and insert the short end into the hole in the switch. Apply silicone adhesive (or double-sided foam servo mount tape) to one side of the switch and insert the wire through the hole in the fuselage, pressing the switch firmly to the radio tray. Make another 90° bend in the wire outside of the fuselage, giving you a small "handle" to pull and push when activating the on/off switch. Besides looking neat, this method provides protection to the switch from dirt, debris and exhaust.

RADIO CHECK: All servo, switch, and battery connections to the receiver are now made. We find it easiest to leave the aileron Y-harness plugged into the receiver aileron channel receptacle all the time, with the two connecting ends hanging loose. Plug your two aileron servo extension chords into the two loose ends of the Y-harness and mount the wing to the fuselage. Turn the radio system on and check the functions of all the controls. Make sure they are moving in the right direction! Thousands of R/C airplanes have crashed over the years because the servos were moving the wrong way! Also make sure all the servos are centered and working perfectly, without any binding. Correct any such problems now. With everything checked and working, now is the time to set the initial control movements.

CONTROL MOVEMENTS
This is an important section of this manual. After flying your EXTRA 300XS for awhile, getting used to its characteristics, you will likely change the control throws to suit your style of flying. But you have to start somewhere and this is where you begin. These movements provide the EXTRA with very smooth control inputs without the immediate need for exponential. We suggest starting out with these movements as your low and high rates. You can easily play with more control throw after you become comfortable with the airplane, especially for 3-D type flying.

SURFACE	SUGGESTED THROWS
AILERONS:	LOWRATE: 7/8" UP - 7/8" DOWN
	HIGH RATE: 1-1/8" UP - 1-1/8" DOWN
ELEVATORS:	LOW RATE: 1" UP - 1" DOWN
	HIGH RATE: 1-1/2" UP - 1-1/2" DOWN
RUDDER:	2-1/4" RIGHT - 2-1/4" LEFT

Remember: Control surface movements should always be measured at the widest point of the control surface.

SAFETY ISSUE: After centering all the servos and setting the control surface throws, make sure each R/C link has a short length of fuel tubing in place to prevent it from coming disconnected from either the control horns or the servo output arms. Also be sure you have tightened each of the 4-40 hex nuts tightly against all threaded R/C links, locking them in place.

DECAL APPLICATION
The decals provided with your kit are reproductions of some of the insignias that are typically seen on full-scale aerobatic airplanes. They are not intended to be a complete set of markings to duplicate one particular EXTRA 300XS. However, we think you'll agree that when applied to the SIG EXTRA as shown on the box label, they look very realistic and believable. Feel free to use all or only some of the decals in different locations as you see fit.

The decals are made of adhesive-backed mylar, they are NOT water activated transfers. These decals are not die-cut and need to be cut from their sheets with a sharp #11 blade or good pair of scissors. Trim as close to the image as possible.

Putting sticky-back decals on a model can be tricky! Especially medium to large size ones like those in this kit. If you don't do it right you will end up with unsightly air bubbles trapped underneath the decal. Here's a method that eliminates that problem entirely and makes the job easy and fun.

You will need a "soapy water" mixture (water mixed with a very small amount of dish soap, or SIG Pure Magic Model Airplane Cleaner, or Fantastic®, Windex®, or 409® type cleaners all work good). You will also need a supple squeegee (the SIG 4" Epoxy Spreader #SIGSH678 is perfect for this job), a couple clean soft cloths (old tee shirts are great), a good straight edge, a ruler, and a hobby knife with sharp #11 blades. We also suggest that you have some trim tape handy for making temporary guidelines (1/8" width or so is perfect) for help in aligning the decals.

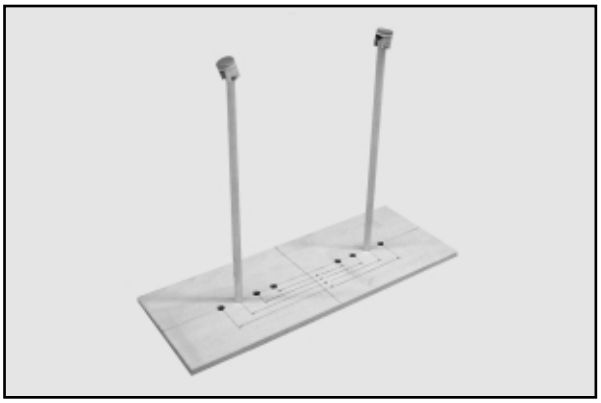
First spray the surface of the model where the decal is to be placed with a soapy water mixture. Then peel the backing sheet completely off the decal, being careful not to let the sticky side double over and adhere to itself. Place the decal onto the wet surface of the model. Do not push down! The soapy water solution will keep the decal from actually sticking to the model until you have had time to shift it around into exact position. Once you have it in position, squeegee the excess soapy water out from under the decal. Mop up the water with a dry cloth. Squeegee repeatedly to get as much of the water out from under the decal as possible. After setting overnight, the decal will be solidly adhered to the surface.

BALANCE YOUR EXTRA

In terms of the flight characteristics you will realize, this is probably the single most important step in preparing your EXTRA for flight. The final placement of the longitudinal Center of Gravity, or Balance Point, is extremely important and should be approached with patience and care.

Completely assemble the model, including propeller, spinner, etc. Do not leave anything off the airplane that will be on it in flight. DO NOT fill the fuel tank for balancing purposes. Some people prefer to balance their airplanes by lifting the model up by one finger at each wingtip to find the spot where the model will sit perfectly level. This has been done for years and is an acceptable way to balance a model (we have included balance measurements for this method). However with an airplane as large as the EXTRA 300XS, it is virtually impossible to balance it by the wingtips by yourself. We prefer to use a "balancing fixture" which checks the model's balance point right along each side of the fuselage (these balance measurements are also given). It can be done alone and is actually more precise than a fingertip balance.

You can make your own simple "balancing fixture" with a couple of 1/4" dia. dowels glued into a fairly substantial wood base, at perpendicular 90° angles. The dowels need to be the same length and tall enough to accommodate the height of the assembled airplane, as well as the width of the fuselage, plus about 1/2" additional width. The tops of the dowels need to be padded to avoid damage to the wing. We used 1/8" thick rubber sheet, cut to 1/4" diameter, glued in place, for the padding. There are commercial units available for balancing but be sure they are large enough to support the weight and size of the EXTRA.



Set the model UPSIDE DOWN on the balancing fixture and shift it back or forward until you find the exact spot where the model will sit perfectly level. Carefully measure the distance of that spot from the leading edge of the wing.

IMPORTANT NOTE: Balanced means the airplane sets level when supported at the desired balance point. Believe it or not, we've had questions like; "When my model is balanced it should sit slightly nose down right?". NO, balanced means level - not nose down or nose up - flat level!

BALANCE REFERENCE POINTS FOR THE EXTRA 300XS

* Percentage of Mean Aerodynamic Chord
** Distance aft of wing leading edge measured right along side of fuselage
*** Distance aft of wing leading edge measured at the wing tips

% MAC*	@ fuse side**	@ wing tip***
25%	4.0"	2.434"
26%	4.172"	2.568"
27%	**4.343"**	**2.702"**
28%	4.477"	2.836"
29%	4.611"	2.971"
30%	4.746"	3.105"
31%	4.880"	3.239"
32%	5.014"	3.373"
33%	5.148"	3.507"

For initial test-flying and familiarization purposes, we suggest a starting balance point of 27%, approximately 4-3/8" behind the leading edge of the wing at the side of the fuselage. (By the way, this translates to about 2-3/4" aft of the leading edge at the wing tip, for those of you who prefer to balance your airplanes that way).

As we all know, as the balance point is moved aft, an airplane will become more responsive in all axis, but it will be especially noticeable to a model pilot in "pitch" (up and down). We have flown the EXTRA at the 30% location and found it to be manageable, with excellent aerobatic capabilities. However, we did notice an increase in pitch sensitivity and had decrease the elevator throw to compensate. "Softening" elevator response with a reasonable exponential percentage also works. In the end, the final balance point and control throws you use will depend somewhat on how you like to fly. Some pilots like their models extremely reactive, others strive for more smoothness. The EXTRA 300XS is an very capable aerobatic machine and can be tailored to fit your style. We therefore suggest that you begin with the 27% CG location and experiment from there.

The best means of shifting the CG fore or aft is to locate the battery pack where it is needed to achieve balance. If doing this does not work and more weight is needed, consider using a larger (and therefore heavier) battery pack. Try to avoid adding useless weight. If you need more weight in the nose, try a heavier spinner or replace the light wheels with heavier after-market wheels. If your model is nose heavy and battery shifting does not work, you can make significant changes in balance with lead stick-on weights. These are unsightly, but should be considered until such time as you have flown the model and are happy with the CG. Once that's done, the weights can be placed inside the fuselage by simply removing the elevator servos and placing the weights inside and securing them. With the elevator servos back in place, the weights are hidden. For reference, our EXTRA 300XS prototypes, using either the Irvine 1.20 or 1.50 and also the Saito 1.50 4-strokes, required no additional weight to achieve balance.

Finally, the aerobatic performance of your EXTRA will benefit greatly if you balance the airplane laterally as well as fore and aft (eliminate the "heavy wingtip" syndrome). Lateral balancing requires that the model be suspended upside down, using substantial chord or fishing line. Loop the line over the engine propeller shaft and the other end over the tailwheel bracket. Hang the model from the ceiling or a rafter, leveling it in side view. With the model secured in this way, observe the wings. Ideally they should be level, without one wing lower than the other. If one wing panel is lower, it means that it is somewhat heavier than the other. When flying the model, this imbalance can cause the model to "pull" to the heavy side, especially in loops and up line maneuvers. To make the airplane track true, the light wing panel needs weight at the tip to balance it level with the other panel. Again, this can be done with stick on weights, which could later be hidden. Always secure weights firmly in place.

ENGINE THRUST ADJUSTMENTS

Your airplane has been carefully built to produce a firewall that is "zeroed out". This is to say that there are no thrust adjustments built into the fuselage. This has been purposely done for several reasons. First, factory built thrust adjustments can be problematic and may not produce exactly what your engine and prop combination needs. Our models have all been flown extensively with no thrust adjustments at all - this means that our models have zero right thrust and zero downthrust. These models fly beautifully and we suggest that you begin the trimming process with these settings. Later, as you gain more experience and time on your airplane, you may wish to adjust the thrust slightly to compensate for your particular engine/prop combination. We suggest "sneaking up" on such adjustments by using 1/64" plywood shims directly between the motor mount bases and the firewall, on the left side of the centerline. Do not use washers, as these will typically bury themselves into the plywood, giving you little or no adjustment.

Used in the manner described, these 1/64" plywood shims will give you about 1 degree of thrust change. With the shims in place, fly the airplane again to see if you have achieved your goal. If you still need further adjustments, either use another piece of 1/64" ply for a second shim or remove the existing shims and use a piece of 1/32" plywood for the new shims. Again, fly the model to see if you have achieved the desired effect. In this manner you will quickly find the optimum thrust adjustments for your particular airplane.

FLYING

If you have carefully followed this assembly manual, you should have no real problems in test flying your EXTRA 300XS. Try to choose a calm day for the first flight. Good conditions will help in correctly evaluating the flight performance of the model. Begin your test flight by making sure the engine is properly set with a reliable idle, a strong top end, and smooth transition performance. We always set our engines to run a little on the rich side and suggest you do the same.

Holding up elevator, taxi the model to get a feel for how it handles on the ground. Make sure you have positive left and right turning ability. If not, make any adjustments needed to achieve positive ground control. Once you are satisfied with the taxi tests, line the model up with the centerline of the runway, nose into the wind. Hold a little up elevator and advance the throttle smoothly - do not

throw the throttle open all at once! The airplane should roll forward smoothly, tailwheel on the ground. As speed builds, slowly back off the elevators and use just a little rudder, only as needed, to maintain a straight takeoff run. The tail will come up as flying speed is reached and a little up elevator will lift the EXTRA off the ground.

Maintain a straight outbound flight path, climbing at a shallow angle until a safe maneuvering altitude is reached. If the model requires trim, fly it to a reasonable altitude before trimming. Make your control inputs smooth and avoid jerking the sticks.

At altitude, make any trim changes needed to achieve hands off, straight and level flight. From our experience, this will take very little trim input, if the model was assembled and balanced properly. Once you're comfortable, make a few circuits around the field to get the feel of the controls. The airplane should demonstrate smooth flight characteristics without jumpiness or over sensitivity. At altitude, try a roll. Then try another roll to the opposite side. Properly trimmed, the EXTRA will roll smoothly and very axially

in either direction. Now try a loop. The EXTRA should pull cleanly through loops, without wandering to either side. Once you're comfortable, try knife-edge flight. You will quickly find that the EXTRA has little or no pitch/roll coupling and that it easily maintains altitude with just a little rudder input! You will also discover that your EXTRA has outstanding inverted flight characteristics. Our prototypes require only the smallest amount of down elevator to maintain level inverted flight!

Assuming you're comfortable and getting used to the airplane, take it to a safe altitude and throttle back to get a feel for the slow flight and stall characteristics. Properly balanced and trimmed, your EXTRA should demonstrate fairly sedate, no fuss stall characteristics. Once flying speed and up elevator input is bled off, the EXTRA should just drop its nose and resume flying as speed picks up. All of this is great information to have when you are setting up the first landing.

Landing the EXTRA is a pleasure. We like to keep a little power on the engine during final approach, down to a few feet off the ground. Back completely off the throttle once the airplane is low to the ground with a good rate of descent established. Flair the airplane as the ground approaches for a smooth 3-point landing and rollout. Hard landings are not necessary, sound piloting skills are.

The second flight should be even more fun because you have by now inputted any required trims learned from the first flight. Before flying again, check the airplane for anything that may have come loose, become disconnected, etc. This is good practice and tends to insure a long life for the model.

As you become more familiar with your EXTRA, you are going to discover its ability to perform aerobatics. The EXTRA is an elegant aerobatic machine with seemingly endless capabilities. For those of you interested in using your EXTRA for 3-D aerobatics, set up your radio to take advantage of the huge control movements available from this model. However, we would urge you to "sneak up" on such control throws, making very sure you have them available to you only on your high rate switches!

MAINTAINING YOUR MODEL

Getting into the habit of routinely performing simple maintenance and inspection of your EXTRA 300 ARF will keep it looking good and flying good for a long time. Full-scale airplanes receive this kind of routine treatment and fly safely for years. Your R/C model airplanes should receive the same consideration.

While still at the flying field, and after you've finished flying for the day, empty the fuel tank completely with your fuel pump. After draining the tank, start the engine and let it run the fuel lines totally dry. Old glow fuel, that has been left in the tank for more than a few hours, will not run properly.

After each flying session, take the time to completely clean your model, removing all spent fuel, dirt, and debris from the finish. We use and suggest fresh, good quality paper towels and a silicon-free cleaner for degreasing and polishing. SIG makes one of the best cleaners for this purpose - Pure Magic Model Airplane Cleaner. This product is great for cleaning, degreasing, and polishing virtually any model aircraft covering material. Clean the model thoroughly, paying special attention to any and all areas that were sprayed by engine exhaust. Clean the airplane until it shines, including the engine, prop, and spinner.

At home, take a little time to completely inspect the airplane, looking for any loose bolts, screws, covering seams, etc. Anything that you find wrong - immediately fix! Inspect the fuselage radio compartment carefully. Check each servo, looking for any loose linkages. Make sure that each R/C link is secured to the servo output arms with short lengths of medium fuel tubing. Then, check each nylon control horn on the flying surfaces for the same thing. Tighten and secure anything that is not supposed be loose. Inspect the engine, looking for any loose bolts or nuts and get them securely back in place right away. Loose engine bolts can almost be totally remedied by removing them, cleaning them with alcohol and using non-permanent thread lock compound, such as Loctite® blue. After applying a little thread lock liquid to the threads, re-install the bolt or nut and tighten it firmly. Also inspect the propeller. Immediately replace any propeller that is cracked or nicked in any way!

Finally, after each flying session you should place the radio system on charge. If several days pass before you fly the airplane again, be sure to charge the radio the night before you plan to fly.

Get into the habit of performing routine inspection and maintenance checks on all your R/C models. It will undoubtedly pay off big someday when you discover an unsafe equipment or structural problem that has developed during the rigors of everyday flying.

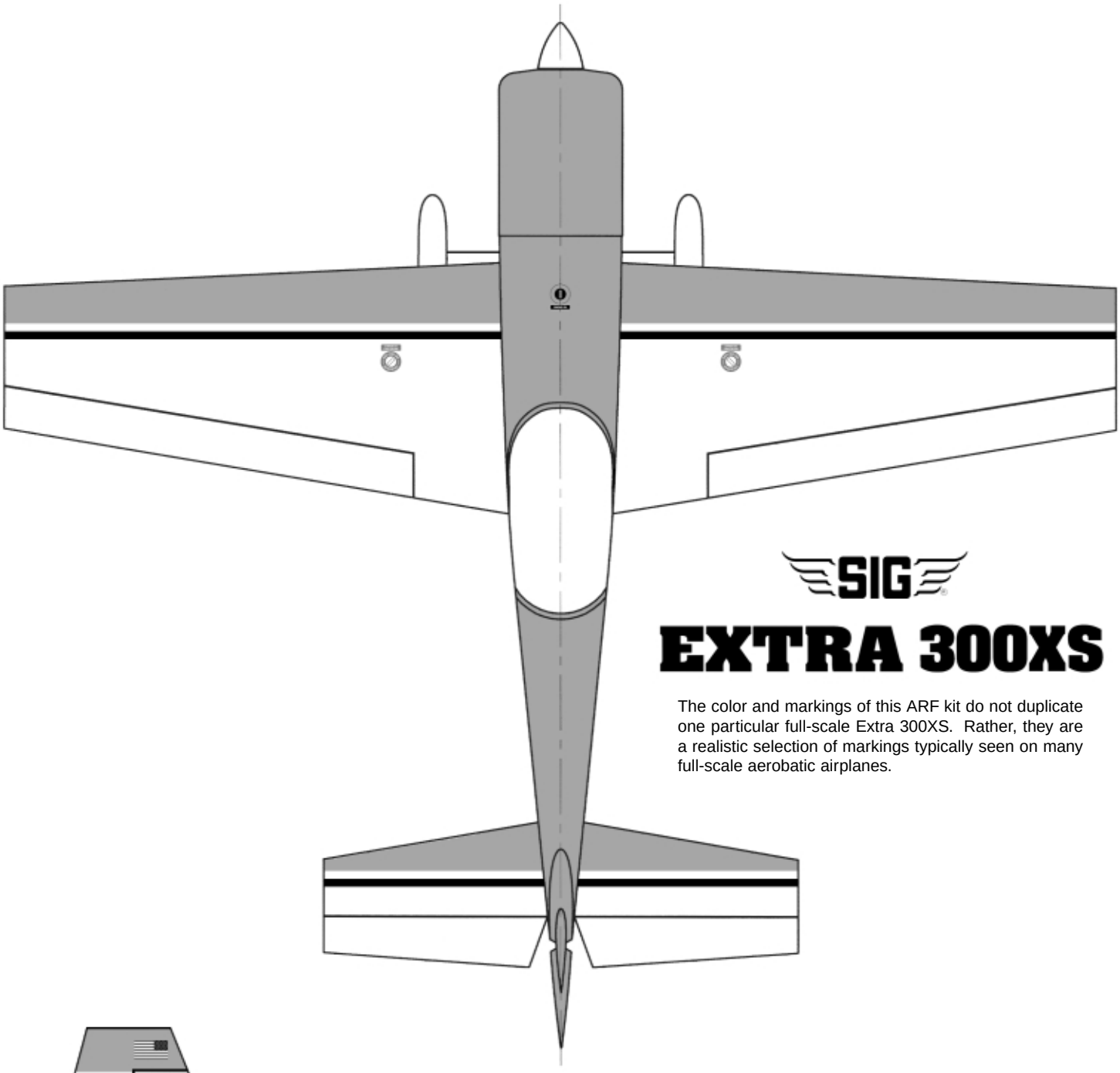
We hope you will enjoy your EXTRA 300XS for a long time to come. Please fly the model safely with constant regard to other fliers, spectators, and property.

Good luck and good flying.

EXTRA 300 LOG BOOK

Date of first flight:

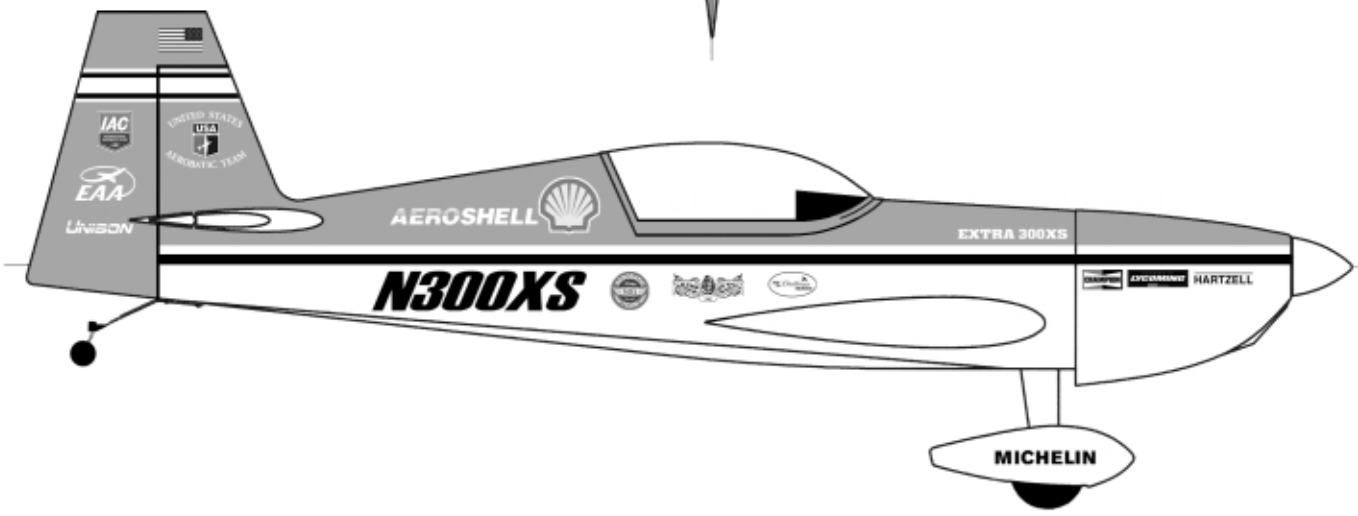
Comments:



SIG

EXTRA 300XS

The color and markings of this ARF kit do not duplicate one particular full-scale Extra 300XS. Rather, they are a realistic selection of markings typically seen on many full-scale aerobatic airplanes.



WARNING! THIS IS NOT A TOY!

Flying machines of any form, either model-size or full-size, are not toys! Because of the speeds that airplanes must achieve in order to fly, they are capable of causing serious bodily harm and property damage if they crash. **IT IS YOUR RESPONSIBILITY AND YOURS ALONE** to assemble this model airplane correctly according to the plans and instructions, to ground test the finished model before each flight to make sure it is completely airworthy, and to always fly your model in a safe location and in a safe manner. The first test flights should only be made by an experienced R/C flyer, familiar with high performance R/C aircraft.

The governing body for radio-control model airplanes in the United States is the **ACADEMY OF MODEL AERONAUTICS,** commonly called the **AMA**. The **AMA SAFETY CODE** provides guidelines for the safe operation of R/C model airplanes. While AMA membership is not necessarily mandatory, it is required by most R/C flying clubs in the U.S. and provides you with important liability insurance in case your R/C model should ever cause serious property damage or personal injury to someone else. For more information, contact:

ACADEMY OF MODEL AERONAUTICS
5161 East Memorial Drive
Muncie, IN 47302
Telephone: (765) 287-1256

AMA WEB SITE: modelaircraft.org

CUSTOMER SERVICE

SIG MANUFACTURING COMPANY, INC. is committed to your success in both assembling and flying the EXTRA 300XS ARF kit. Should you encounter any problem building this kit, or discover any missing or damaged parts, please feel free to contact us by mail or telephone.

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Montezuma, IA 50171-0520

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SIG MODELER'S HOTLINE: 1-641-623-0215
(for technical support)

SIG WEB SITE: www.sigmfg.com

LIMIT OF LIABILITY

The craftsmanship, attention to detail, and actions of the builder/flyer of this model airplane kit will ultimately determine the airworthiness, flight performance, and safety of the finished model. SIG MFG. CO.'s obligation shall be to replace those parts of the kit proven to be defective or missing. The user shall determine the suitability of the product for his or her intended use and shall assume all risk and liability in connection therewith.

WANT A GAS ENGINE FOR YOUR EXTRA 300XS ARF? CHECK THIS OUT!

First Place ENGINES

PROUDLY MADE IN THE U.S.A.

Dedicated to providing the most power at a reasonable cost, First Place Engines are your best choice for large, gasoline powered model airplane power plants. All engines use piston and cylinder assemblies from world-renowned manufacturers such as Husqvarna and Sachs/Makita, insuring long life and easy operation. Using state-of-the-art CNC machines, First Place produces all other major components from high quality billet aluminum and/or bar steel stock. All engines are internally balanced using needle bearings at the top and bottom of the connecting rod, giving you smooth operation. Each First Place Engine comes complete with an electronic ignition system, smoke-ready TIG welded custom aluminum muffler, complete instructions, and a one-year limited warranty.

Sig Manufacturing is pleased to be the exclusive distributor of First Place Engines.

For the SIG EXTRA 300XS - we recommend the

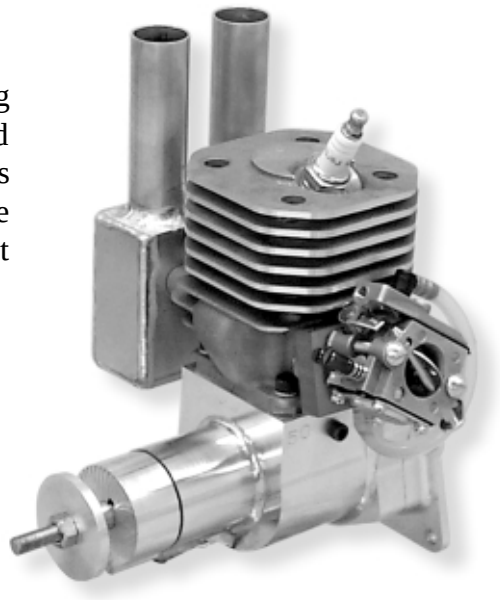
FPE 2.4 cu.in. Gas Engine

This is no overweight, bone-jarring converted lawn care engine!

Chock full of power, the FPE 2.4 is the lightest, smoothest running engine in its class. Utilizing a premium Husqvarna piston and cylinder, *First Place Engines* machines all other major components from billet aluminum and bar steel stock. It's a gas engine designed and produced by modelers for modelers. The perfect power plant for the SIG Extra 300XS!

Specifications:

Size:	2.4 cubic inches (40 cc)
Weight:	52 ounces with muffler
Prop:	20x10
RPM:	7,400 rpm (APC 20x10)
Thrust:	20 pounds
Horsepower:	1.7



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