

ASSEMBLY MANUAL



XCA41

Sbach 300

KIT NO.: SIGRC105EPARF

3D SPORT AEROBATIC AIRPLANE

ALMOST READY TO FLY



For Electric Power!

SPECIFICATIONS:

Wing Span:	50 in.	(1270 mm)
Wing Area:	500 sq.in.	(32.2 dm ²)
Length:	44.25 in.	(1124 mm)
Weight (no battery):	57 - 60 oz.	(1616 - 1701 g)
Weight RTF:	68 - 76 oz.	(1928 - 2154 g)
Wing Loading:	19.6 - 21.9 oz./sq.ft.	(60 - 67 g/dm ²)

Just add your own radio and electric power system:

Radio Req.:	4-Channel with 4 Micro Servos
Electric Power:	"32 Class" Brushless Motor (700 - 900 kv, 600 - 800 watts); 60-75A Speed Control (ESC); 4S 2500 - 4000 mAh Lipo Battery Pack



SIG MFG. CO., INC. PO Box 520 Montezuma, IA 50171-0520
www.sigmfg.com



Here is a sampling of motor sizes that work well in the Sbach XA-41:

- 4 2 5 0 - 8 0 0
- 4 2 5 0 - 7 7 0
- 4 2 4 8 - 8 0 0
- 3 5 5 4 - 8 0 0

What do these numbers mean?

4250-800

CASE DIA. KV CASE LENGTH

Note: This numbering system is very common, however there are exceptions. For instance, some motor manufacturers will list the actual diameter of the stator (armature) inside the motor instead of the case diameter. Some may list the length of the stator inside the motor instead of the case length. Some will give you both if you dig far enough into their specs. Make sure you understand the motor manufacturer's numbering system when shopping for a motor.

INTRODUCTION

Congratulations on your purchase of the SIG SBACH XA-41 EP ARF.

We hope you will enjoy this unique fun scale R/C model. Assembly of your Sbach XA-41 EP ARF is fast and simple when following the detailed instructions in this manual. We urge you to read this assembly manual completely before assembly. Familiarize yourself with the parts and the assembly sequences. The successful assembly and flying of this airplane is your responsibility. If you deviate from these instructions, you may wind-up with problems later on.

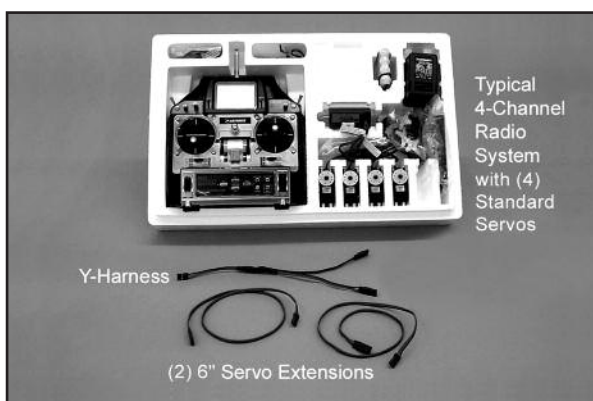
Good luck with the Sbach XA-41. Let's get started!

ADDITIONAL ITEMS YOU WILL NEED TO PURCHASE

In addition to this kit, you will need the following items to complete your Sbach XA-41 and make it flyable.

RADIO SYSTEM

The Sbach XA-41 requires a standard 4-channel radio system and four mini size servos. In addition, you'll need two 6" long Servo Extension Chords (actual length needed will depend on how long the wires are coming off your servos - be sure to double check your servos and plan accordingly), and optionally one standard Y-Harness Chord for connection of the two aileron servos to the receiver.



ELECTRIC POWER SYSTEM

500-800 watt BRUSHLESS OUTRUNNER MOTOR

The Sbach XA-41 is designed to be powered with a 500-800 watt brushless outrunner motor. This size motor is sometimes referred to as a "32" class motor to those who like to make a comparison to a glow motor. Also, the motor you choose should be rated at 800-1000 kv, in order to turn an appropriate propeller.

MOTOR MOUNT

A laser-cut plywood adjustable motor mount is included in this kit. It should work perfectly for any suitable brushless outrunner motor which has an "X" or "cross" motor mount plate on the back.

60-75 amp ESC (Electronic Speed Control)

We used the Castle Creations EDGE LITE 75 ESC in all our Sbach XA-41 prototypes. This is an excellent "switching type" ESC that has a built-in 5 amp BEC that is safe to use with a 4 cell lipo battery pack.

Important Note: BEC (Battery Eliminator Circuit) allows you to use the same battery pack to power both your motor and your radio system, eliminating the normal radio battery pack. When the single battery pack runs down in flight to a prescribed point, the BEC circuit in the ESC will shut down the motor and leave enough power to operate the radio, while you land the model. Note that the BEC feature in some cheaper ESCs does not work with 4 cell and larger lipo battery packs - only 3 cell packs. Check the manual of your particular ESC to learn if this is true in your case. If your ESC is only rated for 3 cell operation, you have three options: 1) fly only 3 cell lipo packs (lower power flight performance); or 2) disable the BEC and install a normal receiver battery pack to run the radio full time; or 3) install an aftermarket BEC that is rated for 3 or 4 cells.

4 cell 2750-4000 mah LIPO BATTERY PACK

You should fly your Sbach XA-41 with a 4 cell (4S1P) Lipo pack. Pack capacity should be 2750-4000 mah. The smaller batteries will give you a lighter airframe that will perform better in 3D aerobatics while the larger batteries will give longer flight times. You will have to adjust the position of the battery to maintain a correct CG balance.

PROPELLER

With electric powered models there are many factors that have a bearing on what propeller to use. The best place to start answering that question is in the instructions that come with

your motor. Another fine source of information is one of the electric flight calculators that are available for you to use free online, (there is a good one on Castle Creations web site).

OUR FLIGHT TEST REPORT

After extensive test flying, our favorite setup for the Sbach XA-41 is a 4250 (case dimensions) 770 kv brushless motor, with a 75 amp ESC, 4S lipo battery pack, and an APC 13 x 6.5 E propeller. This combination gave outstanding flight performance. When using a 4S 3200 mAh lipo, we had flight times around 6 to 7 minutes, depending of course on throttle management. A 4000 mAh lipo pack provided between 8 to 9 minutes of flight time. Your results may vary. Prop size, size and quality of the battery pack, throttle management, air temperature, etc., all have a bearing on electric flight performance and flight time. Experiment to find the best combination for your setup.

BATTERY CHARGER

FOR SAFETY, AS WELL AS PERFORMANCE, CHARGE LIPO BATTERIES ONLY WITH A LIPO BATTERY CHARGER!

In addition to providing the critical charging profile needed to safely charge lipo batteries, a lipo battery charger also includes the capability of "balancing" the available voltage in the cells, ensuring that the battery pack is at peak capacity at the end of the charge cycle. This translates to better flight times and a longer life from the battery pack.

REQUIRED TOOLS

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

- A selection of glues - SIG Thin, Medium, & Thick CA Glue
- CA Accelerator, CA Debonder
- SIG Kwik-Set 5-Minute Epoxy

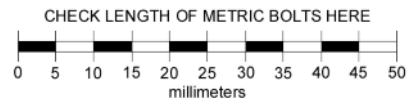
- Screwdriver Assortment
- Pliers - Needle Nose & Flat Nose
- Diagonal Wire Cutters
- Small Allen Wrench Assortment
- Pin Vise for Small Dia. Drill Bits
- Hobby Knife with Sharp #11 Blades
- Small Power Drill With Selection of Bits
- Dremel® Tool With Selection of Sanding & Grinding Bits
- Scissors
- Sandpaper
- Covering Iron & Trim Seal Tool
- Masking Tape
- Paper Towels
- Alcohol and/or Acetone For Epoxy Clean-up

COMPLETE KIT PARTS LIST

The following is a complete list of all parts contained in this kit. Before beginning assembly, we suggest that you take the time to inventory the parts in your kit. Use the check-off boxes provided in front of each part description. Please also note that the bolts and nuts required to mount your engine to the motor mounts are not included and must be purchased separately.

- (1) Fuselage
- (1) Fuselage Top Hatch
- (1) Clear Canopy
- (1) Right Wing Panel & Aileron, hinges not glued
- (1) Left Wing Panel & Aileron, hinges not glued
- (1) Aluminum Tube Wing Joiner
- (2) M6.5 x 45 mm nylon wing bolts with T-Head
- (1) Horizontal Stabilizer & Elevator, hinges not glued
- (1) Vertical Fin & Rudder, hinges not glued
- (1) Fiberglass Cowling
- (4) M3 x 10mm Screws, for cowl mounting

- (1) Aluminum Right Main Landing Gear
- (1) Aluminum Left Main Landing Gear
- (3) M4 x 20mm Socket-Head Bolts, for mounting landing gear
- (2) 2-1/8" dia. Main Wheels
- (2) 4mm dia. Threaded Axles
- (4) 5mm Hex Nuts; for axles
- (4) 4mm ID Wheels Collars; for axles
- (1) Right Fiberglass Wheel Pant
- (1) Left Fiberglass Wheel Pant
- (4) Nylon Control Horns; for ail(2), ele(1), rud(1)
- (1) Control Horn Backplate; for elevator control horn
- (12) M2 x 12mm screws; for control horns
- (4) Metal Clevis; for ail(2), ele(1), rud(1)
- (4) 5.5mm long pieces of Fuel Tubing
- (4) Nylon Pushrod Snap Keepers; for ail(2), ele(1), rud(1)
- (4) M3 x 10mm Sheet Metal Screws; for cowling
- (4) M3 x 10mm Socket-Head Bolts; for wheel pants
- (4) M4 x 16mm Mounting Bolts; for mounting electric motor
- (4) M4 x 20mm Socket-Head Bolts; for main landing gear
- (4) M4 Flat Metal Washers; for main landing gear
- (4) M4 Split-Ring Lock Washers; for electric motor mount
- (4) M4 Blind Mounting Nuts; for motor mount
- (1) Tailwheel Assembly
- (1) Nylon Rudder Steering Control Rod Guide
- (2) M3 x 12mm Sheet Metal Screws; for tail wheel assembly
- (2) 250mm long Plastic Cinch Straps
- (1) 10mm x 10mm x 300mm Balsa Triangle
- (2) 22.5" long Wire Pushrods, threaded on one end, including M2 Hex Nuts(2); for elevator & rudder.
- (2) 7 1/8" Wire Pushrods threaded on one end, including M2 Hex Nuts(2);for Ailerons



COVERING MATERIAL

Your Sbach XA-41 ARF is covered with ORACOVER®, a premium quality covering made in Germany, and sold in the U.S. by Hanger-9 as Ultracote®.

Colors Used On Your Airplane:

- ORACOVER® #52 Dark Blue, (Ultracote® HANU885)
- ORACOVER® #10 White, (Ultracote® HANU870)
- ORACOVER® #30 Cub Yellow, (Ultracote® #HANU884)
- ORACOVER® #23 Ferrari Red, (Ultracote® #HANU866)

If sometime in the future you need replacement covering or matching paint for repairs, they are available from your local hobby dealer or online from Hanger-9.

How To Tighten Loose Covering

After you open your Sbach XA-41 and take all the covered parts out of their plastic bags, the covering may begin to wrinkle. This is not unusual and is no cause for alarm. Your airplane was built and covered in a part of the world, which has 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. However, wrinkles are easy to remove by just using a hobby type heat iron.

Caution: Trying to remove the wrinkles by hastily going over them with a heat gun can lead to more problems. You should take your time to carefully go over the entire model with a covering iron, as we will describe.



We suggest using a model airplane covering iron for this process. Cover the iron's shoe with a thin cotton cloth, such as an old t-shirt, to prevent scratching the covering as you work. After covering your iron, the next step is to set the iron to the correct temperature. This is critical for achieving a good result! The iron should be set to about **220°F - 250°F (104°C - 121°C)** as measured on the bottom of the iron using a thermometer.

If you do not have a thermometer, you can find the correct temperature by trial and error. Set your iron to a medium setting. Glide the iron over some of the covering that is over solid wood, such as the sheeted wing center section. Observe the covering to see if any bubbles appear. If bubbles appear, the covering is getting too hot! Turn down the temperature of the iron and repeat the test. If no bubbles appear, turn up the heat slightly and repeat the test. Keep adjusting until you "zero in" on the correct temperature. Find the temperature that will get the covering to stick down without forming bubbles or causing the seams to pull away.

Once your iron is set to the correct temperature, go over the entire framework of the airplane, making sure that the covering is securely bonded to the structure everywhere the covering comes in contact with the wood underneath. This takes some time, but is worth the effort.



After you have all the covering secured onto the solid areas, turn the temperature of the iron up to approximately **300°F - 320°F (149°C - 160°C)**. This is the correct temperature for shrinking the covering material.

Use the iron to tighten up any wrinkles in the "open" areas of the model (no wood underneath the covering). Glide the iron over the wrinkle for a few seconds, then remove. Repeat until the covering is tight with no wrinkles.

If wrinkles keep coming back on the tail surfaces, you may need to "ventilate" the areas between the ribs. Otherwise the

air that is sealed in those relatively small areas will expand when the heat is applied and actually cause the covering to stretch instead of shrink. Use a pin to poke a tiny hole in the covering between each rib, on the bottom of the part. That will let the expanding air escape and the covering to shrink properly.

Note that the black checkerboard sections of the model are done with adhesive backed vinyl and care should be taken when shrinking covering around them. The vinyl will shrink and melt with too much heat. A heat gun is preferred for these areas of the Sbach.

Caution When Using Heat Guns: You can also use a hobby-type heat gun to shrink the covering, but you must be careful around seams or color joints. Getting too much heat on the seams may cause them to "creep" or come loose. You must also be careful when using a heat gun when working around the windshield and side windows - heat will distort the clear plastic material.

Recommended Temperatures:

To adhere the covering - 220°F - 250°F (104°C - 121°C)

To shrink the covering - 300°F - 320°F (149°C - 160°C)

NOTE: In this manual, any references to right or left, refer to your right or left as if you were seated in the cockpit of the airplane.

WING ASSEMBLY

The wings are designed as a 2-piece system, with separate right and left wing panels that mount to the side of the Sbach XA-41. The aluminum tube spar maintains the structural integrity of the wing through the fuselage and a hardwood locating pin at the rear help keep the wings in alignment. The obvious benefit of the removable wing panels is the fact that they can be easily transported or stored, requiring a minimum of space.

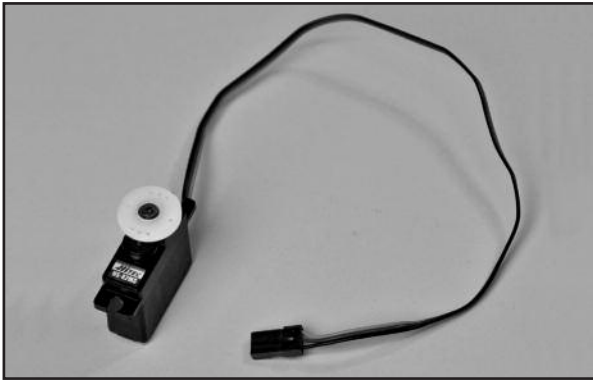
To help protect your wings during the following steps, we recommend that you cover your work surface with a soft cloth or piece of foam.

INSTALLING THE AILERON SERVOS

For the following steps you will need:

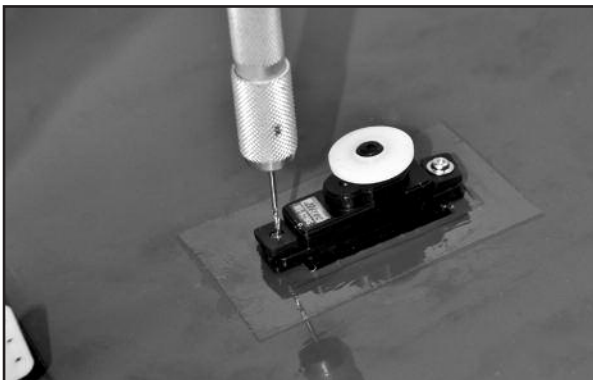
- (1) Right Wing Panel
- (1) Left Wing Panel
- (2) Servos with Mounting Screws (not furnished)
- (1) Optional Servo Y- Harness (not furnished)

- 1) Mount aileron servos in the bottom of each wing panel.
 - a) The servo bays are precut for you but you'll want to double check the covering around the cutout to make sure it is sealed down tight.
 - b) Install the rubber grommets and brass eyelets (supplied with your radio system) into each aileron servo.
 - c) Install the control arms on the two aileron servos. The arms should be at 90 degrees to the servo when the aileron control stick on the transmitter is in neutral and the transmitter trims are in neutral as well.
 - d) Before installing the aileron servos in the wing panels, you must attach a servo extension chord to the aileron servo wire. The typical combined length required is approximately 18". A 6" extension chord will usually provide sufficient length. Plug the servo plug into the extension chord and tape the plugs together for added security.



e) Holding the wing panel with the wingtip UP, drop the end of the extension chord into the servo mount cutout and then thru the openings in the wing ribs, working it towards to the center end of the wing panel. The plug on the end of the extension chord will occasionally get hung up on the ribs, however by turning or gently shaking the wing panel you can get it to fall through the openings in the ribs, until it emerges at the end rib. Once you've got the plug to the end rib, direct it through the round hole in the bottom surface of the wing panel. By that time, the servo itself should be next to the servo mount cutout and ready for mounting.

f) Fit the servo into the servo mount in the wing panel, (note that the servo is positioned so that the servo arm is at the forward end toward the wing leading edge). Take up any slack in the servo cord as you insert the servo in the mount. Use a pin vise and a small drill bit to drill small pilot holes in the servo mount for the servo mounting screws. Use the screws supplied with your radio system to mount the servo in place on the servo mount. Repeat this procedure to mount the servo in the opposite wing panel.



HINGING THE AILERONS

□ 2) Note that the CA Hinges are installed, but not yet glued, in the ailerons and wing panels. The installation process for the hinges is the same for all of the control surfaces on this model.

a) If you removed the ailerons and hinges from the wing panels when you tightened the covering material, reinstall them now. First insert the five CA Hinges into the slots in the aileron. Put two pins in the center of each hinge, up against the leading edge of the aileron, to keep the hinges centered during the next step.

b) Now carefully insert the exposed portion of the five hinges into the trailing edge of the wing. You will find it easiest to slide the hinges into the slots at angle, one hinge at a time, instead of trying to push it straight onto all the hinges at once.

c) Adjust the aileron so that the tip of the aileron is flush with the wing tip. The ailerons should be tight against the pins in the hinges to minimize the gap between the wing and the

aileron. The aileron is now in the proper position for permanently gluing them in place with thin CA glue.



d) Flex the aileron down and hold it in this position. Remove the pins from one hinge and then carefully apply 3-4 drops of Thin CA glue directly onto the hinge in the gap. You will notice that the glue is quickly wicked into the slot as it penetrates both the wood and the hinge. We suggest using a fine tipped applicator on the glue bottle to better control the flow of glue.



e) Turn the part over and glue the other side of the hinge. Continue this process until you have glued both sides of all the hinges! Keep a rag handy to wipe off any excess Thin CA glue. (If you get some glue smears on the plastic covering, don't worry about them right now. Once all the hinging is done, you can clean the smears off the covering with CA Debonder).

f) Let the glue dry 10-15 minutes before flexing the hinges. At first you might notice a little stiffness in the joint. This will go away after the hinges have been flexed back and forth a couple dozen times.

INSTALL AILERON CONTROL HORNS & PUSHRODS

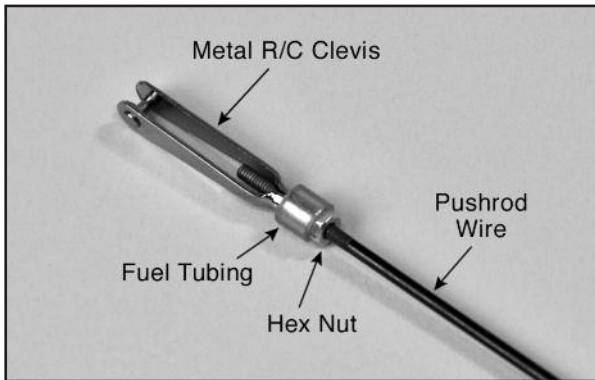
From the kit contents locate:

- (2) Nylon Control Horns
- (6) M2 x 12 mm Screws
- (2) Short Pushrod Wires with M2 Hex Nut
- (2) Metal R/C Clevis
- (2) Nylon Snap Keepers
- (2) Small Pieces of Fuel Tubing

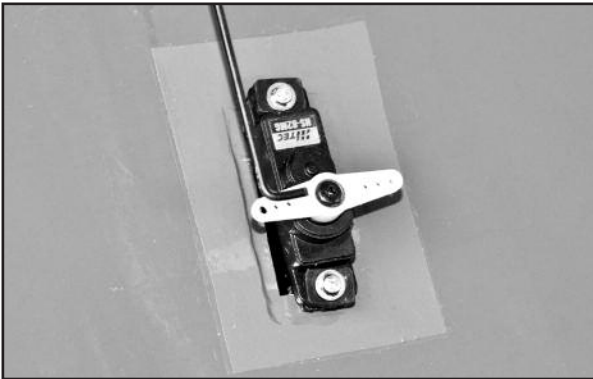
□ 3) Look closely and you will see three holes pre-drilled in the bottom of the ailerons for mounting the nylon control horns. Screw the control horn in position on the bottom of the aileron using three M2 x 12mm screws. Since these screw directly into the wood it is a good idea to reinforce the threads in the wood with some thin CA glue. Remove the screws and horns and put a small drop of thin CA into each screw hole to strengthen the threads in the wood. Then once the glue has set reinstall the control horn and screws. Be careful not to over tighten the screws and strip out the wood.



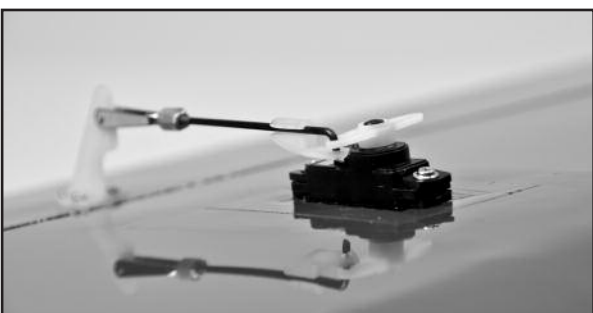
- 4) Next assemble and install the aileron pushrods.
 - a) Slide a short piece of Fuel Tubing onto the small end of the Metal R/C Clevis. Screw the Hex Nut on the Aileron Pushrod Wire all the way up to the end of the threads. Then screw the metal clevis halfway onto the threaded end of the Aileron Pushrod Wire.



- b) Clip the metal clevis into the last hole in the nylon control horn. Lay the other end of the pushrod wire over the outer hole in the servo arm. Use a felt tip pen to mark the wire where it crosses the hole. Use a pair of pliers to put a sharp 90-degree bend in the wire at the mark.



- c) Insert the bent end of the pushrod into the servo arm, from the top. You will most likely need to use a 1/16" dia. drill to open the hole in the servo arm to accept the pushrod wire.
 - d) Mark and cut off the excess end of the pushrod wire, leaving 1/8" of wire protruding below the bottom of the servo arm.



- e) Clip a Nylon Snap Keeper in place on the servo end of the pushrod wire. Snap the free end of the keeper up and over the protruding end of the pushrod wire, underneath the servo arm.
 - f) Check that the aileron servo is in neutral position and adjust the metal clevis as needed to get the aileron in neutral position.
 - g) Once the ailerons are properly adjusted, insure that the metal clevis can't open up and come loose from the control horn by sliding the piece of Fuel Tubing over the arms of the clevis. Also, tighten the M2 Hex Nut up against the back of the clevis.

FUSELAGE ASSEMBLY

INSTALL THE MAIN LANDING GEAR

Locate the following parts from the kit contents:

- (1) Fuselage
- (2) Aluminum Main Landing Gear
- (4) M4 x 20mm Socket-Head Bolts
- (4) M4 Split-Ring Lock Washers
- (2) 2-1/4" dia. Main Wheels
- (2) 4mm dia. Threaded Axles
- (4) 5mm Hex Nuts; for axles
- (4) 4mm ID Wheel Collars; for axles
- (1) Right Fiberglass Wheel Pant
- (1) Left Fiberglass Wheel Pant
- (4) M3 x 12mm Socket-Head Bolts

NOTE: We suggest you use a thread locking liquid (like Loctite®) on all bolts and nuts used in the assembly of the landing gear.

- 5) Install a Threaded Axle into the large hole of the landing gear leg, with the plain end of the axle shaft pointing to the outside. Secure the axle with the two 5mm Hex Nuts. When tightening the nuts, keep the flats of the nut on the axle side of the gear leg parallel to the front edge of the leg - (see photo). This allows the hex nut to fit inside the narrow notch in the wheel pants when they are added later.



- 6) Slide a 4mm Wheel Collar onto the axle shaft, but leave approximately 1/16" of space between it and the nut, to provide proper spacing of the wheel in the wheel pant. Tighten the wheel collar set screw securely.

- 7) Next slide one of the Main Wheels onto the axle and test to make sure it spins freely. If it does not turn freely, drill out the plastic hub of the wheel with an 11/64" or #17 drill bit.



□ 8) Slide a second Wheel Collar onto the axle and up to the wheel. Leave a small gap between it and the wheel, so the wheel will turn freely, and then tighten the wheel collar set screw.

□ 9) Check the orientation of the landing gear to make sure you know which way is forward. The landing gear should angle to the rear of the airplane. Test fit the wheel pants over the wheels and line up the predrilled mounting holes. Secure the wheel pants in place with two M3 x 12mm socket head bolts on each pant.



□ 10) Using three M4 x 20mm Socket-Head Bolts and three M4 Split-Ring Lock Washers attach the landing gear to the fuselage.



TAIL SURFACE INSTALLATION

For the following steps you will need:

- (1) Fuselage
- (1) Wing
- (1) Stabilizer & Elevator set.
- (1) Vertical Fin & Rudder Set
- (2) M6.5 Nylon Wing Bolts
- (1) Tailwheel assembly, including Wheel and Wheel Collars
- (2) M3 x 12mm Screws
- (1) Nylon Rudder Steering Clasp with Bolt and Hex Nut
- (2) Nylon Control Horns
- (6) M2 x 14mm Sheet Metal Screws

□ 11) Just like the aileron hinges, the elevator hinges are factory installed, but not yet glued. Hinge the elevator assembly to the stabilizer, using the same techniques you did for the ailerons - refer to page 5 of this manual. Let the hinges dry adequately before proceeding.

□ 12) Look closely and you will see three holes pre-drilled in one of the elevators for mounting a nylon control horn. Screw the control horn in position on the bottom of the right elevator, using three M2 x 12mm screws. When the tips of the screws begin to emerge at the top surface of the elevator, add the control horn's nylon retaining plate. Continue turning in the screws until the horn and retaining plate are snug against both surfaces of the elevator. Do not over tighten the screws and crush the wood.



□ 13) Bolt the wing in place on the fuselage with the Nylon Wing Bolts provided. Then pin the stabilizer and elevator assembly in place on the fuselage. It's time to check the alignment of the stabilizer to the wing.

a) First view the model from directly in front. Check to see if the stabilizer is level with the wing. You should find it to be very close. If necessary use a sanding block to fine tune the stabilizer platform to level the stabilizer to the wing.

b) Next use a tape measure to measure the distance from each stab tip to the back edge of the wing - the distance should be equal on both sides. Adjust if necessary. When you are satisfied with the alignment, proceed to the next step.

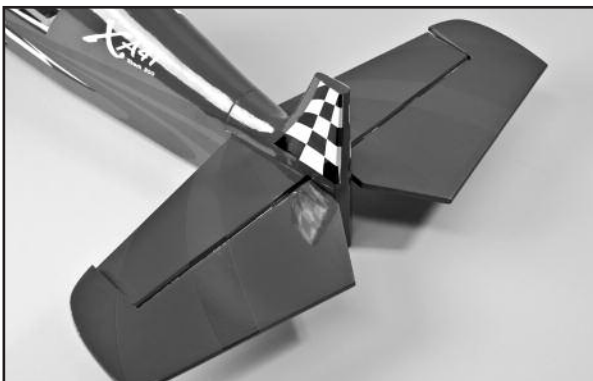
□ 14) The horizontal stabilizer is now glued in place into the rear of the fuselage. We suggest using slow drying epoxy glue



for this job to allow time to position the stab accurately and make any final adjustments that might be needed. Apply the glue to both sides and reset the stab in place. Use pins to hold it in place. Recheck the alignment. Wipe away any excess epoxy with rubbing alcohol and a soft paper towel. Allow the glue to set completely.

□ 15) Pull the Fin and Rudder off their hinges and set the rudder aside for now. Test fit the fin in place on top of the fuselage and stabilizer. Check to see that the fin sits flush and perpendicular to the stabilizer.

□ 16) Glue the fin in place using slow drying epoxy glue. Apply a thin coat of glue to the bottom of the fin and to the exposed wood on the stab. With the fin in place, sight the model from the front to make sure the fin is absolutely 90 degrees upright to the stab. If needed, use a little masking tape to hold it in alignment. Wipe off any excess glue with rubbing alcohol and a soft paper towel.



□ 17) Hinge the rudder to the fin and the rear of the fuselage using the same techniques you did for the other hinges - refer to page 5 of this manual. Make sure to line up the top of the rudder flush with the top of the fin. This will ensure the tailwheel bracket lines up correctly. Let the hinges dry adequately before proceeding.

□ 18) Look closely and you will find three holes pre-drilled near the bottom of the rudder for mounting a nylon control horn. Install the control horn on the left side of the rudder, using three M2 x 14mm screws. Once again, it is advised to remove the screws and reinforce the threads into the wood with some thin CA. Then reinstall the control horn and the screws.



TAILWHEEL INSTALLATION

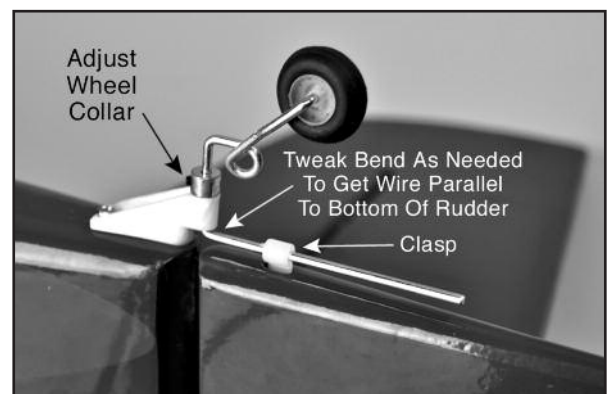
□ 19) Locate the Tailwheel assembly and the nylon bearing.
 a) Temporarily mount the Tailwheel assembly in place on the lower rear end of the fuselage, using two M3 x 12mm screws. Note that there are two pilot holes already in the fuselage for the screws.

b) Adjust the wheel collar shown to set the height of the tailwheel wire. Then check to see if the long steering leg of the tailwheel wire is parallel to the bottom of the rudder. The wire may need to be tweaked slightly to make it parallel. Remove the screws and reinforce the threads with thin CA as we did with the control horns.



c) Slide the bearing onto the wire that runs along the bottom of the rudder. The tab of the bearing will be epoxied into the slot that is pre-cut on the bottom of the rudder. Test fit the assembly to make sure everything will line up.

d) Mix up some epoxy and put a dab into the slot in the rudder for the nylon bearing. Re-install the tailwheel assembly and insert the nylon bearing tab into the slot. Clean up any excess epoxy that spills out. Tighten down the M3 x 12mm screws into the fuselage. Let the epoxy dry.



RADIO INSTALLATION

For this section you will need:

- (1) Radio Receiver (not furnished)
- (2) Servos with Mounting Screws (not furnished)
- (1) Plastic Cinch Straps

□ 20) Install the rudder and elevator servos inside the fuselage in the built-in radio mounting tray. Note that the rudder servo goes on the right side of the airplane and the elevator servo goes on the left side. Be sure to drill pilot holes through the plywood tray for the mounting servo mounting screws.



□ 21) Secure your receiver on the front of the plywood radio tray with one of the plastic cinch straps provided. It's best to use a piece of foam rubber between the receiver and the plywood. Also, don't tighten the cinch strap too snug - just enough to keep the receiver in place.



NOTE: If you are not using BEC, but are instead using a separate receiver battery, you can mount your on/off switch in the pre-cut hole in the fuselage side. You will need to open up the covering where the hole is cut in the wood.

ELEVATOR & RUDDER PUSHROD INSTALLATION

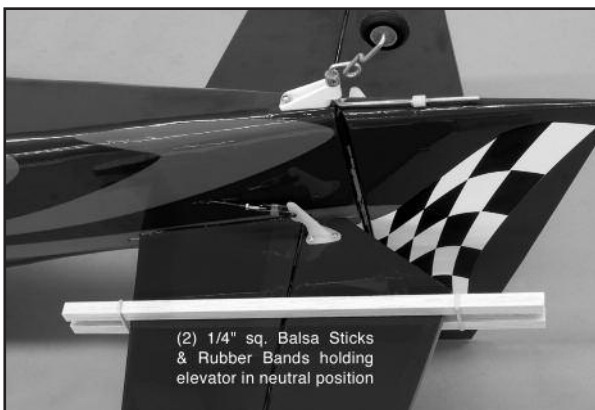
For this section you will need:

- (1) Fuselage
- (2) Long Pushrod Wires with M2 Hex Nut
- (2) Metal R/C Clevis
- (2) Nylon Snap Keepers
- (2) Small Pieces of Fuel Tubing

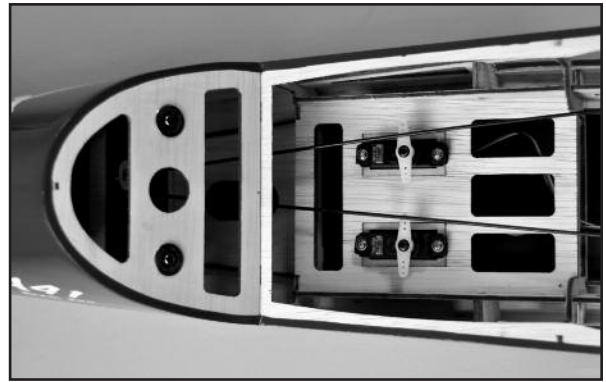
□ 22) Assemble and install the elevator pushrod.

a) First slide a small piece of Fuel Tubing onto the small end of the Metal R/C Clevis. Next, screw the Hex Nut that is on the Pushrod Wire all the way up to the end of the threads. Then screw the metal clevis halfway onto the threads (same as you did back in Step 4a on page 6).

b) Locate the pre-cut pushrod exit hole for the elevator on the right side of the fuselage at the back of the plane. Slide the pushrod into the exit hole and inside the pushrod sleeve built into the fuselage. Slide it in until you can clip the clevis into the middle hole of the control horn. Lock the elevator in neutral position with tape or with two small balsa wood sticks held together with small rubber bands.



c) Inside the fuselage, hold the pushrod wire over the elevator servo output arm and mark the wire where it crosses over the outer hole in the servo arm.



d) At the tail end, unlock the elevator from neutral position, and then unclip the clevis from the control horn. Remove the clevis and the hex nut completely off of the pushrod and set them aside. Now pull the pushrod out of the fuselage from the servo end. It will be easier to complete the next three steps with the pushrod out of the airplane.

e) Cut off the pushrod wire 1/4" past the mark made at the servo end in step c). Then put a sharp 90-degree bend in the wire at the mark.

f) Remove the servo arm from the elevator servo. Drill out the last hole in the servo arm with a 1/16" dia. drill so it will accept the pushrod wire. Then insert the bent end of the pushrod wire into the servo arm, from the top.

g) Clip a Nylon Snap Keeper in place to hold the pushrod wire in the servo arm. Snap the free end of the keeper up and over the protruding end of the pushrod wire, underneath the servo arm.

h) Now slide the pushrod back inside the pushrod sleeve in the fuselage, from the front. When it is in far enough, put the servo arm back in place on the servo.

i) Make sure that the elevator servo is in neutral position and then adjust the metal clevis at the tail end as needed to get the elevator in perfect neutral position.

j) After the elevator is properly adjusted, insure that the metal clevis can't open up and come loose from the control horn by sliding the small piece of fuel tubing over the arms of the clevis. Also tighten the M2 Hex Nut up against the back of the clevis.



□ 23) Locate the pre-cut pushrod exit hole for the rudder on the left side of the fuselage at the back of the plane and repeat step (22) in its entirety to install the rudder pushrod.

ELECTRIC MOTOR & ESC INSTALLATION

For this section you will need:

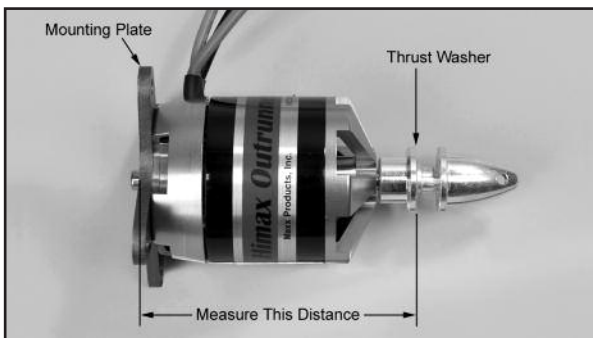
- (1) Fuselage
- (1) Plastic Canopy cover
- (1) Wooden canopy hatch frame
- (1) Balsa Triangle Stock
- (4) M4 x 16mm Socket-Head Bolts

- (4) M4 Split-Ring Lock Washers
- (4) M4 Blind Nuts
- (1) Hook-and-Loop Tape (Velcro®)
- (1) Set Electric Motor, ESC, Prop, Lipo Battery (not furnished)

NOTE: The mounting of the electric motor in the Sbach XA-41 assumes that your motor has a typical "X" or "cross" mounting plate on the back of the motor.

□ 24) The firewall portion of the laser-cut plywood motor mount is adjustable fore and aft to accommodate different length motors. Next, we will determine where you should set it.

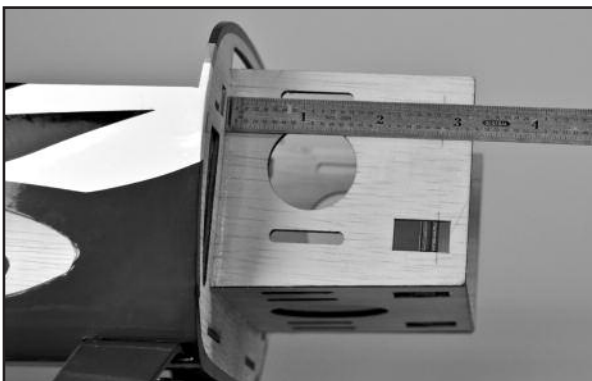
□ 25) Assemble your motor according to the manufacturer's instructions. Then carefully measure the distance from the back of the mounting plate to the front of the thrust washer.
****The "thrust washer" is the part of the prop adaptor where the back of the propeller will be located.**



□ 26) For the Sbach XA-41, we need a finished distance from the back edge of the motor mount to the motor's thrust washer to end up exactly 5-1/2". This is important so the cowling will fit properly.

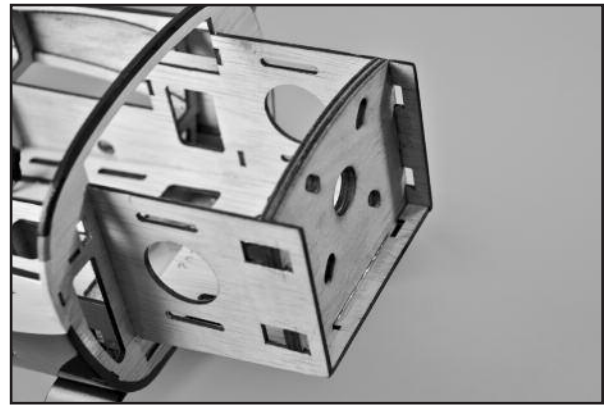
a) So what you need to do is to subtract the measurement taken in the previous step (27) from 5-1/2". The result is the distance you need to set the front of the firewall from the back edge of the plywood motor mount box. (With the motor we are using in these photos, the motor measurement is 2-1/2". So 5-1/2" minus 2-1/2" = 3". Your result may be different.)

b) Next, carefully measure and mark the distance determined in the previous step from the back edge of the motor mount box towards the front. Do this along side each of the adjustment slots on both sides of the box (four marks total).



c) After you have all four slots marked, carefully align the front face of the firewall to line up with the marks. Make sure you end up with the firewall straight and square in the box. If it is not, recheck your marks and adjust as necessary.

d) Tack glue the firewall in place. Recheck once more to make sure that the front of the firewall is at the correct distance from the back of the motor mount box. That distance plus the length of your motor must equal 5-1/2". When satisfied it is correct, glue the firewall securely to the rest of the motor mount box.



□ 27) Install your motor on the firewall using the hardware included with your motor.

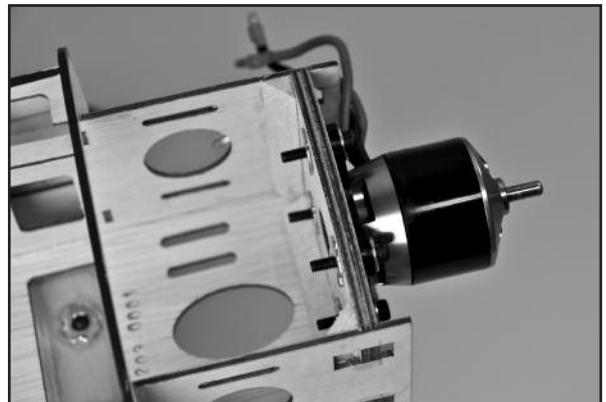
a) Using four blindnuts and bolts loosely attach the motor into the four angled slots in the firewall.

b) Check to make sure the motor is centered on the firewall.

c) Put a drop of medium CA on the flanges of the blind nuts to secure them to the plywood, but be careful not to get any glue on the threads.

d) Tighten down all the bolts to hold the motor in place on the firewall.

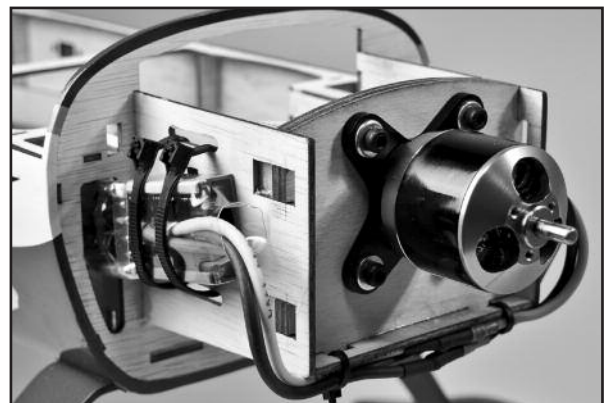
□ 28) Locate the piece of balsa triangle stock provided. Measure, cut and install pieces to reinforce the all corner joints inside the motor mount box. Use Med or Thick CA glue for this job to ensure a good bond and gap filling.



□ 29) Install your Speed Controller (ESC).

a) Solder appropriate connectors (not supplied) to the battery leads of your ESC.

b) Mount your ESC onto the side of the motor box right behind the firewall, using one of the plastic cinch straps provided. Or if you prefer you can mount the ESC with double-sided servo tape or Velcro® (neither of these are provided).

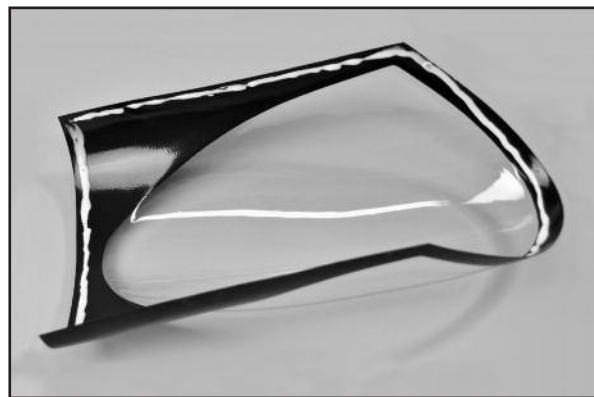
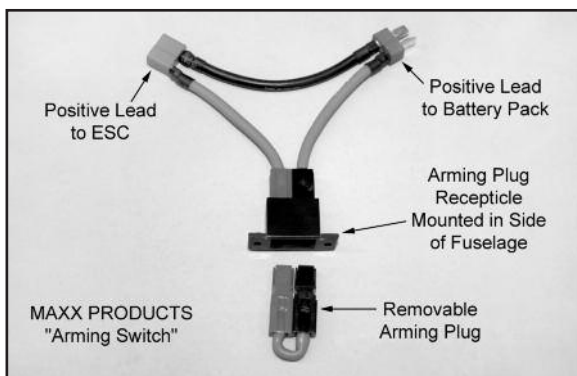


c) Run the ESC's servo cord back to the receiver and plug it in.

d) Connect the ESC's motor wires to the motor. Operate the motor and check the direction of rotation. Always do this without a propeller attached! If you need to reverse the rotation, refer to the instructions that came with the motor and ESC.

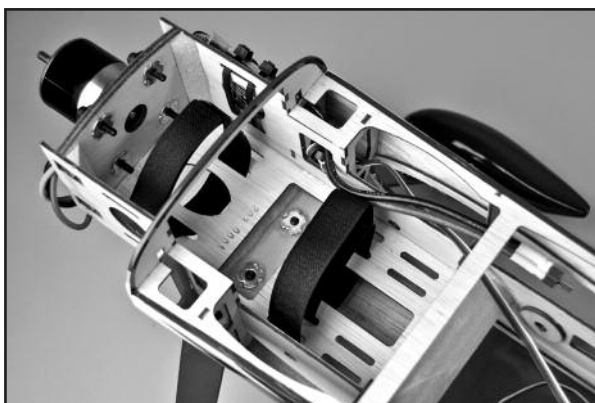
e) Secure the motor/esc wires to the motor box to prevent them from rubbing on the motor as it is spinning.

SAFETY ISSUE: We strongly recommend the use of an "arming switch" for your motor installation. With an arming switch you can install your battery pack in the airplane and hook up the wires without danger of the motor starting. The arming switch keeps the electricity away from the motor until you "arm" it when you are ready to takeoff. The most common arming switches are a simple external plug that puts a break in the positive battery lead to the motor, such as the Maxx Products Arming Switch shown below. There are also arming switches built into some of the advanced ESCs now on the market.



□ 30) Secure the battery to the tray.

a) Locate the hook and loop straps and run them down the outside slots in the battery tray. They should form a loop around the tray and where the battery will go. For added security you can install some sticky back hook and loop material (not included) on the battery tray as well as your battery to further secure it to the tray.



□ 31) Attach the canopy to the Fuselage Top Hatch.

a) Locate the plastic canopy and the covered wooden Fuselage Top Hatch. Test fit the canopy on the hatch. Allow the canopy to overhang the rear of the hatch by 1/8" to 1/4".

b) Permanently glue the canopy on to the hatch with a flexible RC-56 type glue (not supplied). Place a narrow bead of glue all around the edge of the canopy where it will meet the frame.

c) Place the canopy on the frame and confirm that it is properly aligned. Lock it in place with some masking tape to dry. Use a wet paper towel to clean up any glue that seeps out from the edges.

COWLING INSTALLATION

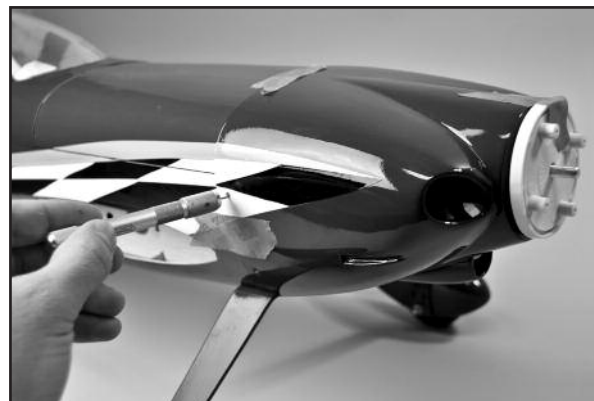
For this section you will need:

- (1) Fuselage
- (1) Fiberglass Cowling
- (4) M3 x 10mm Screws

□ 32) Mount the cowling on the fuselage with the four M3 x 10mm Screws provided. Notice that the holes for the four cowl mounting screws are already pre-drilled in the cowling - two on each side.

a) First, test fit the cowling in place on the fuselage. As you pass it over the motor, make sure all the wires are out of the way. Carefully adjust the exact position of the cowling. Make sure you have adequate clearance between the front of the cowl and the back of the spinner, and that the spinner backplate is centered in the hole. Use a low tack tape to hold the cowling securely in place for the next step.

b) Use a 5/64" or #45 bit to drill a pilot hole for the top left cowl mounting screw. Center the drill in the hole in the cowling and drill into the fuselage side. Install an M3 x 10mm screw in the pilot hole - do not over-tighten the screw.



c) Recheck the position of the cowling and make any adjustments needed to get it back in perfect position, securing the tape to hold it in place.

d) Now drill another pilot hole for the upper screw on the other side of the cowling. Install the screw.

e) Repeat this process to install the two bottom cowl mounting screws. Remove all the tape.



□ 33) Mount a suitable propeller on your motor with the included spinner. Be sure to balance the prop before installation.

CONGRATULATIONS!

Your Sbach XA-41 EP is completely assembled. However, it is NOT ready for flight! There are a few very critical pre-flight tasks we must perform before flying. These are extremely important and should be approached with patience and care.

PRE-FLIGHT

BALANCE

Balancing your airplane may be the single most important step in preparing it for flight. All airplanes, model or full-size, must be accurately balanced in order to fly successfully. An airplane that is not properly balanced will be unstable and will most likely crash.

NOT ALL SBACH XA-41's WILL BALANCE THE SAME

It is impossible to produce a model airplane kit that will automatically have the correct balance point. Not everyone uses the same motor or radio gear - and all those items can vary in weight! Even propellers of the same size can vary as much as a 3/4 oz. between different brands. That's why every model must be balanced before flying. Don't feel that whatever the balance point your model came out at is "good enough". Check carefully and make whatever adjustments are required. Trying to fly an out of balance model is dangerous!

Preliminary: All the parts and components that will be in the airplane in flight must be installed in their correct positions. This includes all the radio gear, the propeller, battery pack, etc. Every piece of essential equipment must be installed, ready for flight.

BALANCE POINTS FOR SPORT/PRECISION PATTERN

The following table lists inch measurements and the equivalent percent of MAC (Mean Aerodynamic Chord) for typical range of balance points for sport and precision pattern flying.

Note: Measurements are aft of the leading edge of the wing, at the fuselage sides.

<u>DISTANCE</u>	=	<u>% MAC</u>
2.83"	=	28%
3.04"	=	30%
3.24"	=	32%

BALANCE POINTS FOR 3D

The following table lists inch measurements and the equivalent percent of MAC (Mean Aerodynamic Chord) for typical range of balance points for sport and precision pattern flying.

Note: Measurements are aft of the leading edge of the wing, at the fuselage sides.

<u>DISTANCE</u>	=	<u>% MAC</u>
3.24"	=	32%
3.44"	=	34%
3.65"	=	36%

If you are unsure where to start, a balance point approximately 3" aft of the leading edge is a safe bet for initial test flights. After test flying, you can adjust the balance point to fit your flying style. Remember, it has been said that a nose-heavy model may fly poorly; however a tail-heavy model may fly only once. Keep in mind that an aft CG is good for 3D aerobatics, but a more nose-heavy CG is often better for precision flight and is much easier to land gracefully. It's best to start out toward the nose-heavy side, and then re-adjust as flight testing indicates.

When you experiment with CG location, move the CG only small amounts, 1/8 inch or so, at a time. A small change in CG can have a large affect on flight characteristics.

Fine Tuning The Balance Point For Advanced Aerobatics

For aerobatic flying you'll want a "neutral CG", one which will usually provide very little (if any) throttle/pitch coupling. The nose will stay put when power is increased/decreased. The nose will not drop much during turns. When you roll a neutral CG airplane inverted, the airplane neither climbs nor dives. In contrast, a slightly nose heavy airplane usually requires you to hold some "down" elevator to keep the airplane flying straight while inverted.

An easy way to test for neutral CG is to do the "roll inverted" test. Trim your plane for your Sbach for straight and level hands-off upright flight at about 1/2 throttle. The Sbach should be able to fly straight and level with no control input. Once you are satisfied with the trim in upright flight, you need to test it inverted. With sufficient altitude, pull the Sbach to a 45 degree up line, establish this line and immediately roll the aircraft inverted. The plane should hold the 45-degree line for about 2-3 seconds before slowly dropping towards the canopy. If instead it wants to climb, you are tail heavy and should move the battery forward until it holds the line. If the Sbach wants to drop sharply, you are too nose heavy and should move the battery aft until it holds the line. It may take a few tries of adjusting the battery pack to find the sweet spot for the CG, but the time to do this will make the plane fly much better.

For less-experienced RC pilots, the neutrally balanced airplane can be challenging to fly. For instance, the nose doesn't drop as the plane slows down; the plane usually descends in a level attitude. Hence, there are typically no

visual clues of an impending stall. When put into a dive, the neutrally-balanced plane will not self-recover; it will continue on the path until the pilot gives some stick input. Same is true for climbs.

CONTROL SURFACE TRAVEL

The following control surface data has been flight tested with the Sbach XA-41. However these numbers are only recommended as a starting point. Your flying style may dictate changes. Always measure the throws from the widest part front to back of the control surface.

<u>LOW RATES</u>		
Elevator	5/8" up 5/8" down	30%-40% expo
Ailerons	1/2" up 1/2" down	30%-40% expo
Rudder	2-3/4" right 2-3/4" left	40%-50% expo
<u>HIGH RATES</u>		
Elevator	1-5/8" up 1-5/8" down	45%-60% expo
Ailerons	1" up 1" down	45%-60% expo
Rudder	4" right 4" left	50-70%% expo

High Rate Throws

High rate control throws are only meant for extreme aerobatics - not for normal flying. You should be competent and comfortable flying your Sbach XA-41 with normal control throws before attempting high rates.

Exponential: You will find lots of opinions about the proper amount of exponential travel to use on each control surface in both low and high rate settings. The best aerobatic pilots in the world agree that you will want more expo at high rates than at low rates. After test flights adjust your settings as needed to obtain the control feel you want. Consult your radio manual to find out how to adjust the exponential settings of your transmitter.

FLYING

When it comes to test flying a new model, we always advise modelers to choose a calm day with little or no wind. These conditions allow you to better evaluate and more accurately adjust the trim requirements for your airplane. As we've mentioned before, a good running, reliable motor is a must for the ultimate success of your airplane. Take the time to solve any power system problems before you try to fly.

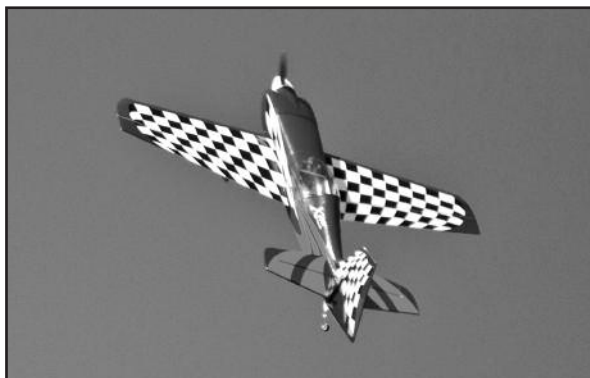
Always make it part of your pre-flight routine to check each control on the airplane, making sure the surfaces are moving in the correct directions. Also check each control linkage to be sure they are secure and that nothing is loose. With all the controls checked, make a range check with your radio system, making sure everything is working perfectly.

For take-off, the airplane should be lined-up with the center of the field with the nose pointed directly into the wind. Hold a little up elevator and smoothly advance the throttle. As the Sbach begins moving forward, use the rudder as needed to

keep the air- plane going straight. At takeoff speed, use a slight amount of up elevator to lift off, using ailerons to keep the wings level. Climb to a reasonable altitude before making any trim changes.



The Sbach is a fully capable aerobatic plane. Start with the plane on low rates to get a feel for how it handles. It does not take a lot of control to get the Sbach to loop and roll. Make sure your first maneuvers are done at an altitude that you can recover from until you are comfortable with how the plane performs. We also recommend that you test a few stalls to get used to how slow you can fly the Sbach before losing lift and how it recovers. We found that with a proper CG that the stall was mild and generally straightforward. The Sbach is also capable of 3D flight so once you're comfortable with the plane at normal flying speed flip the rates to high and try out its post stall flight in harriers, hovers, snaps, and spins.



We have found that with the recommended setup and a 3000 mAh 4 cell lithium Polymer battery that we averaged 7 minutes of flight so set your timer accordingly to have some reserve for your landing. The Sbach tracks really well in slow speed but you'll want to keep a little power on until you are over the runway and ready to flare. Keep a little backpressure on the elevator stick and try to land on all three wheels. After landing, always remember to hold up elevator when taxiing to keep the tailwheel firmly to the ground.

We hope that your Sbach XA-41 will provide you with many enjoyable hours of flight. Good luck and safe flying!





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.

JOIN THE AMA

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 MFG. CO., INC. is committed to your success in both assembling and flying the SBACH XA-41 EP ARF. 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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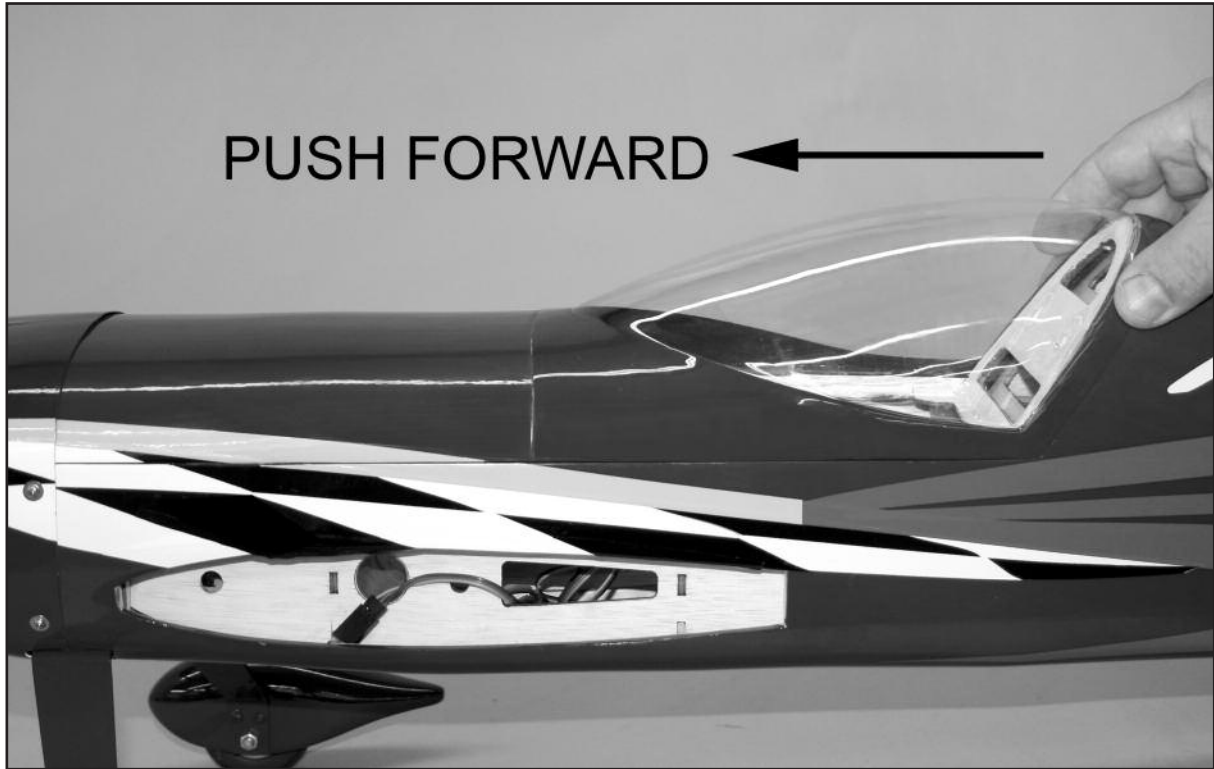
SIG WEB SITE: www.sigmfg.com
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LIMIT OF LIABILITY

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.

REMOVING THE HATCH FROM THE SBACH

The Sbach's Top Hatch is held on the fuselage by 2 pins at the front, and 2 magnets and 2 rear tabs at the back. To remove the top hatch from the fuselage start by first sliding the hatch forward about 1/4" to disengage the magnets and the rear tabs from the fuselage. Then lift up on the back end of the hatch. Pull the hatch up and back to disengage the front pins and lift the hatch off of the fuselage.



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