ASSEMBLY MANUAL

SIG

RASCAL EP-49

KIT NO. SIGRC80EPARF

ALMOST READY TO FLY

Electric Powered R/C Airplane

Wingspan: 49 in. (1245 mm)
Wing Area: 324 sq.in. (20.9 dm^2)
Length: 32-1/2 in. (825.5 mm)
Flying Weight: 22 - 25 oz. (624 - 700 g)
Wing Loading: 9.7 - 11.1 oz./sq.ft. (30 - 33 g/dm^2)
Radio Req.: 4 Channel, Mini Receiver,
4 Mini Servos

SIG MFG. CO., INC.

PO Box 520   Montezuma, IA 50171-0520
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ALMOST READY TO FLY

RASCAL EP-49

Electric Powered R/C Airplane

INTRODUCTION

Congratulations on your purchase of the SIG RASCAL EP-49 ARF kit. The legend of the RASCAL began with a small rubber-powered free-flight model in the 1940s. Adapted for modern radio control, the RASCAL's classic good looks and dream-come-true flying characteristics have made it the favorite everyday airplane of thousands of R/C pilots.

SIG offers the RASCAL design in several sizes. This 49 inch wingspan version blends the legendary RASCAL flying characteristics with a state-of-the-art brushless electric power system. Included in the kit is a 2410-09 Brushless Outrunner Motor, 18 amp speed control (ESC), and a performance matched 8.5x8 EP propeller. Add a 3-cell 850-1400 mah lipo battery pack and you will have a marvelous little R/C ship with outstanding flight performance that is a pure joy to fly. And it's small enough to carry around in your vehicle completely assembled and ready to fly almost anywhere, anytime!

Assembly of your RASCAL EP-49 ARF is fast and simple when following the detailed instructions in this manual. A low parts count and professional engineering ensure quick and easy assembly. All parts are CAD-drawn, laser-cut, and jig assembled, which means that everything fits the way it should! We urge you to read this instruction manual completely before starting assembly, to familiarize yourself with the parts and the assembly sequence.

ELECTRIC POWER SYSTEM

MOTOR (supplied): Your RASCAL EP-49 comes with a powerful 90-watt brushless motor, ready to easily and quickly install using the directions in this assembly manual.

ESC ELECTRONIC SPEED CONTROL (supplied): An 18 amp Brushless type Electronic Speed Control is included. This ESC is factory wired, with exception of the battery connector leads.

PROPELLER (supplied): A SIG 8-1/2 x 8 EP propeller is furnished with this model. This propeller provides excellent flight performance throughout the model's flight envelope.

BATTERY PACK (not supplied): The included motor and ESC is designed to use 3S1P Lithium Polymer (LiPo) battery packs in the 850-1400 mAh capacities. Properly charged, these packs deliver excellent power and duration for the RASCAL EP-49.

NOTE: *As battery packs go up in capacity, so does their weight. In turn, this can effect the recommended Center of Gravity location for this model. Use the pack size and capacity that best suits the model in terms of the C.G. location. See the "Balance Your Airplane" section of this manual for more details.*

BATTERY CHARGER (not supplied): FOR SAFETY AND PERFORMANCE, CHARGE LITHIUM POLYMER BATTERIES ONLY WITH A LITHIUM POLYMER 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.

RADIO EQUIPMENT

The RASCAL EP-49 gets its great flight performance from many factors, but two of the most important factors are its lightweight and generous wing area. The lighter the final weight is, the better this airplane will fly! Since this model is factory built and covered, you can only realistically control the finished, ready-to-fly weight by choosing the most appropriate radio equipment for a model of this size. In short, the flight performance of your RASCAL EP-49 will be directly controlled by the weight of the radio equipment you choose to put in it. Maximum performance can only be achieved with lightweight components.

RECEIVER: A small or "micro" size receiver should be used in this model due to weight and size constraints. In our flight tests of the KADET EP-42B, we have used the following dual conversion receivers:

Receiver	Weight
FMA M5 FM	11 grams
Hitec Electron 6 FM	19 grams
Hitec Minima 2.4GHz	6.5 grams

SERVOS: "Standard" size servos (the ones that come with most sport radio systems) are too big and too heavy for the RASCAL EP-49. You will need smaller servos. In our flight tests of the RASCAL EP-49, we have used the following servos.

Servo	Weight	Torque
Hitec HS-55	7.9 grams	15 in/oz
Airtronics 94091	9.0 grams	18 in/oz

NOTE: *Any other brand of servo that is in the same size and torque range will also work just fine.*

SERVO CHORDS: You will need one Y-Harness Chord to connect the two aileron servos together. This allows you to operate both aileron servos off of one receiver lead. Every radio manufacturer has Y-Harness Chords available for their radio systems. Also, depending on exactly how long the wires are on your aileron servos, you will most likely need two 6" Servo Extension Chords to give you enough wire length to run through the wing.

NOTE: *In our prototype installations, we leave the single end of the Y-harness plugged into the receiver permanently, and then, unplug the two aileron servo extension chords from the Y-harness when we remove the wing from the airplane.*

COVERING MATERIAL

Your RASCAL EP-49 is covered with ORACOVER®, a premium quality covering made in Germany, and sold in the U.S. by Hanger-9 as Ultracote®.

<u>Colors Used On Your Airplane</u>
ORACOVER® #10 White (Ultracote® #HANU870)
and
ORACOVER® #29 Transparent Red (Ultracote® #HANU950)
or
ORACOVER® #39 Transparent Yellow (Ultracote® #HANU952)

Wrinkles? After you remove the covered model parts from their plastic bags, you may notice within the first couple days that some of the covering material may become slack or wrinkled. If that's the case, there is no need to be alarmed. The covering is not defective! Your RASCAL EP-49 was covered in a part of the world that has consistently high humidity, and some of that moisture is retained in the balsa wood when the parts were put in the bags.

When exposed to drier air, the wood loses the excess moisture, dimensionally shrinking microscopically in the process. That's all it takes to cause some slight relaxing of the covering, causing wrinkles to appear.

Any wrinkles that appear in the covering are easy to remove by applying a little heat from a small modeler's heat iron. Because of this model's small size, we do not recommend using a heat gun to tighten up loose covering. A typical hobby type covering iron will work just fine. Even better is a small modeler's "trim seal" iron, which is perfect for controlling the heat applied to a specific area.

First, use the tip of the hot iron to go over all the seams and color joints in the covering, making sure they are all sealed down and well adhered. Then, hold the hot iron over the wrinkle to lightly shrink the material. Be very careful whenever working around seams. Re-heating seams can cause them to "creep", making them unsightly. A very easy way to avoid damaging seams and joints when re-shrinking the covering is to protect the seams with wet paper towels rolled into strips. These are placed directly onto the seams and their coolness protects the seam from shifting or "crawling" under heat. You must also be careful when using a heat iron or heat gun when working around the window and windshield areas - heat will distort these plastic pieces.

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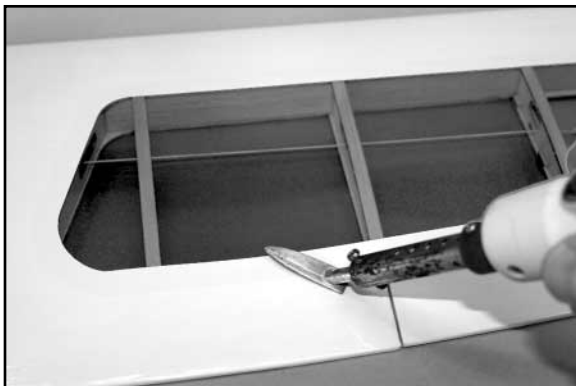
REQUIRED TOOLS
For proper assembly, we suggest you have the following tools and materials available:

❏ A selection of glues - Thin, Medium, and Thick SIG CA, and SIG Epoxy Glue (5-minute and 30-minute)
❏ SIG Fine point CA Applicator Tips
❏ Screwdrivers
❏ Pliers - Needle Nose and Flat Nose
❏ Wire Cutters
❏ Soldering Iron & Flux
❏ Drill with Assorted Drill Bits
❏ 1.5 mm Hex Wrench or Ball Driver

❏ Pin Vise for small diameter drill bits
❏ Small T-Pins
❏ Sandpaper
❏ Hobby Knife with sharp #11 blades
❏ Scissors
❏ Covering Iron and Trim Seal Tool
❏ Paper Towels
❏ Rubbing Alcohol (for cleaning off excess epoxy glue)

KIT INVENTORY:
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.

1 bag ❏ (1) Fuselage, with
    Clear Plastic Windshield installed
    Elevator & Rudder Pushrod Tubes installed
1 bag ❏ (1) Right Wing Panel with hinged Aileron
1 bag ❏ (1) Left Wing Panel with hinged Aileron
1 bag ❏ (1) Stabilizer & Elevator, hinged
1 bag ❏ (1) Fin & Rudder w/ hinges installed but not glued
1 bag ❏ (1) Plastic Cowling
    ❏ (7) M2 x 6 mm PWA Screws; for cowl mounting(4) & motor mounting(3)
1 bag ❏ (1) Battery Hatch
    ❏ (1) Landing Gear Spreader
    ❏ (1) Plywood Wing Joiner
    ❏ (1) 3/4" x 1-3/4" Hook-&-Loop Tape (Velcro®)
    ❏ (1) M3 x 18mm Wing Mounting Bolt
1 bag ❏ (1) Right Aileron Servo Hatch
    ❏ (1) Left Aileron Servo Hatch
    ❏ (4) 6 x 10 x 12 mm Hardwood Servo Mount Blocks
1 bag ❏ (8) M2 x 8 mm PWA Screws for servo hatches
1 bag ❏ (1) Molded Clear Plastic Right & Left Side Windows
1 bag ❏ (1) 2.5mm dia. Formed Main Landing Gear Wire
1 bag ❏ (2) 1-3/4" dia. Main Wheels
1 bag ❏ (1) Right Wheel Pant
    ❏ (1) Left Wheel Pant
1 bag ❏ (2) Metal Wheel Pant Mounting Straps
    ❏ (4) M2 x 5.5 mm PWA Screws for straps
1 bag ❏ (1) Steerable Tailwheel Assembly w/ Tailwheel & Brass Bearing Plate
    ❏ (2) M2 x 8 mm PWA Screws for tailwheel assembly
1 bag ❏ (4) Nylon Control Horns
    ❏ (4) Nylon Pushrod Keepers
1 bag ❏ (2) Wire Pushrods (short) w/ z-bend and adjustment "V" in one end; for ailerons
    ❏ (2) Wire Pushrods (long) w/ z-bend and adjustment "V" in one end; for elevator & rudder
1 bag ❏ (1) SIG 2410-09 Brushless Outrunner Electric Motor with 18 amp ESC and Rubber Spinner
1 bag ❏ (1) SIG 8-1/2 x 8 EP Propeller, with Brass Hex Nut & Aluminum Sleeve
1 bag ❏ (1) RASCAL EP-49 Decal Sheet

NOTE: "PWA" refers to a screw or bolt with a phillips-head and an integral washer flange.
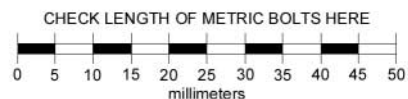
NOTE: In this manual, any references to right or left, refer to your right or left as if you were seated in the cockpit of the airplane.

WING ASSEMBLY
From the kit contents locate the Right and Left Wing Panels and the Plywood Wing Joiner. You will also need epoxy glue, epoxy mixing supplies, paper towels, and rubbing alcohol.

❏ 1) For maximum strength, we recommend using SIG Epoxy Glue for joining the wing panels in this step.

a) Trial fit both wing panels together, without glue, on the plywood wing joiner to familiarize yourself with the assembly. Then, take back apart.

b) Mix up a small amount of epoxy glue. Use a wire or stick to quickly coat the inside of the wing joiner slot in the end of the right wing panel. Also, coat the right half of the plywood wing joiner with glue. Push the plywood wing joiner all the way into the slot in the right wing panel. Hold the wing joiner in place until the glue dries, wiping off any excess glue that oozes out of the joint.

c) Mix up a batch of epoxy glue. Use a wire or stick to coat the inside of the slot in the end of the left wing panel with glue. Also, coat the stub of the plywood wing joiner, that is sticking out of the right wing panel, and the bare wood end ribs of both wing panels. Then, put the wing panels together. Squeeze the panels tightly together, aligning the leading and trailing edges of the wing panels with each other. Wipe off any excess glue that oozes out of the joint with a paper towel soaked in rubbing alcohol. Hold or tape the wing panels in proper position until dry.
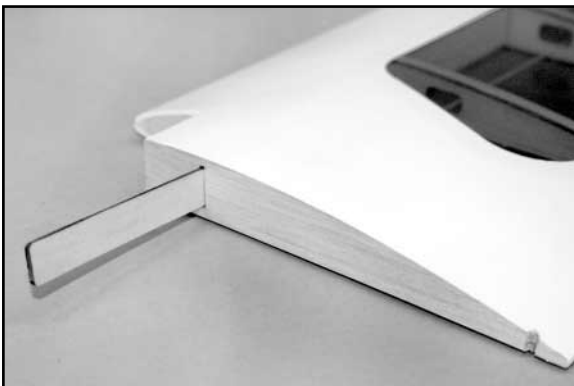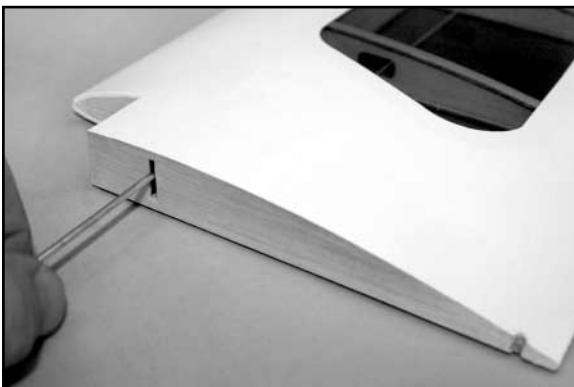
NOTE: If possible, get someone to help you with this step. An extra set of hands makes the job much easier. While one person holds the two wing panels together in correct alignment, the other person can clean off the excess glue and tape the wing panels tightly together.

❏ 2) Test fit the wing on the fuselage. Make sure the wing slides all the way forward, snug against the back of the fuselage former.
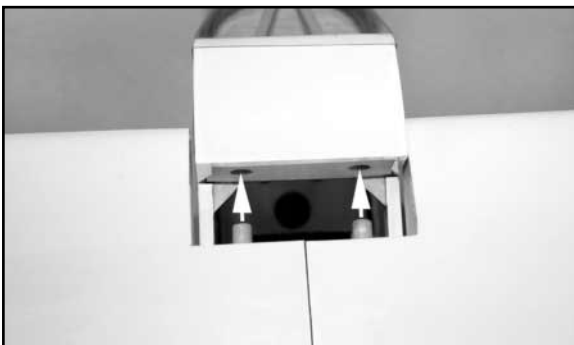
At the rear, align the wing carefully on the fuselage, and then use the metal M3 x 18mm PWA Bolt to secure the wing in place on the fuselage. After checking the fit, remove the wing.

AILERON HOOKUP
For this section you will need the assembled Wing, (2) Aileron Servos and appropriate Chords (see radio notes at beginning of this book), (2) Short Formed Wire Pushrods, (2) Nylon Control Horns, and (2) Nylon Pushrod Keepers.

❏ 3) Note that the ailerons are permanently hinged in place. Give each aileron a gentle pull to the rear to double check that they are securely glued.

❏ 4) The aileron servos will be mounted on the back (uncovered) side of the plywood Servo Hatches.

a) Center the servo control arm, and then hold the servo in position on the back of one of the hatches. Make sure that you have the servos control arm centered in the pre-cut slot in the hatch - centered both horizontally and vertically. It needs to be right in the middle of the slot when at neutral!

b) Mark the bottom of the servo mounting lugs onto the hatch. Also mark the sides of the servo case.

c) Use Medium CA or epoxy to glue two Hardwood Servo Mounting Blocks in position on the hatch, right up against the lines you drew on the hatch, as shown. Let dry.

d) Mount your servo to the hatch, using the screws that were provided with the radio system. Be sure to drill pilot holes in the mounting blocks before screwing the servo in place.

e) Set up and turn on your radio system to center the servo and check servo travel. Check to see that the servo control arm does not bind on the slot in the hatch at extremes of travel.

f) Repeat steps 4a) through e) to mount the other aileron servo to the other hatch.
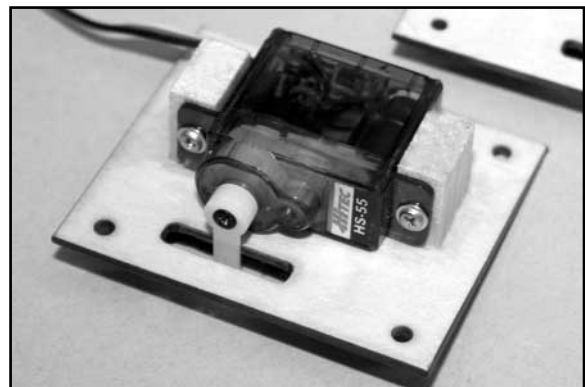
NOTE: If you have a double-sided servo arm, cut off the side of the arm that you won't be using so that it cannot bind on the top of covering when the servo and hatch are installed in wing.

❏ 5) Looking inside the aileron servo mount opening in the bottom of the wing, you will find a short length of scrap wood with a string tied to it. The other end of this string is tied to another piece

of scrap wood in the round hole near the center of the wing. This string is used to pull the aileron servo chord through the wing, from the servo mount towards the center section, in the following steps.
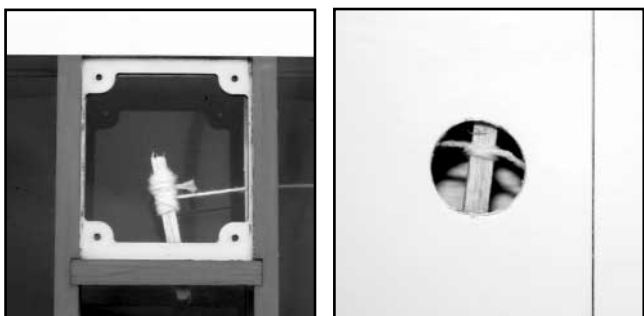
a) Working on one aileron at a time, plug a 6" servo extension chord onto the end of your aileron servo wire. Secure this connection with a piece of plastic tape.

b) With a needle nose pliers, grab hold of the scrap wood in the servo mount opening. Gently break the wood loose from the wing structure, and then pull the wood and string a couple inches out of the opening. Untie the string from the wood piece, and re-tie it securely to the end of your aileron servo chord.
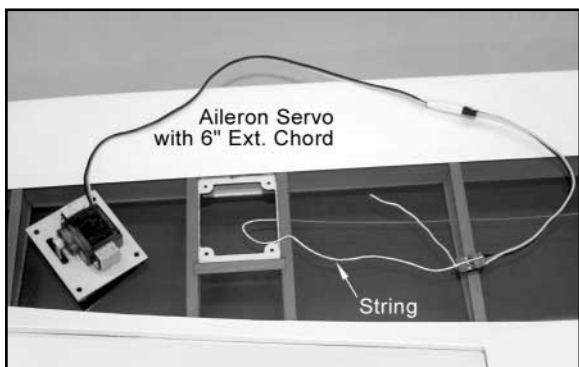

c) Now break loose the other end of the string at the center of the wing, and carefully begin pulling the end of the aileron chord down into the servo mount opening and through the wing. You will encounter obstructions as the servo plug bumps into the rib structure inside the wing. When you do, don't pull too hard on the string! You will find that by gently tugging back and forth alternately on the string at the center and then on the servo chord at the opening, that you can eventually work the plug past the obstructions. Keep feeding the servo chord through the wing until the end plug comes out the hole at the center of the wing. Remove the string from the end of the servo chord. Tape the servo chord to the wing surface so it cannot fall back into the hole.


d) Mount the aileron servo in the wing, using the screws that came with the servo.

e) Repeat steps 5a) through d) to install the other aileron servo in the other wing panel.
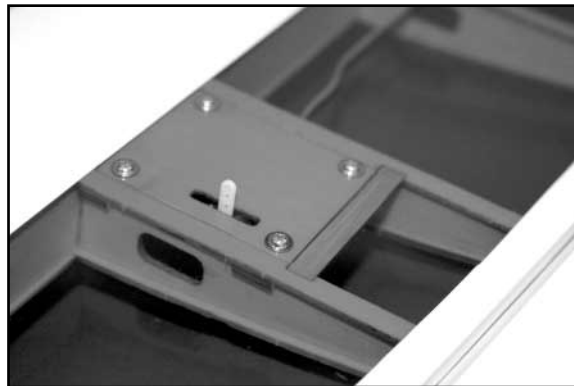
❑ 6) In this step we will install a Nylon Control Horn on the bottom of each aileron. Make sure the horn is directly in line with the servo arm, and that the base of the horn is right at the front edge of the aileron. Follow these steps.

a) First, with a sharp hobby knife or razor blade shorten the pegs on the bottom of the control horns, so the pegs won't poke through the covering on the top side of the ailerons. Cut off half the length of the pegs.
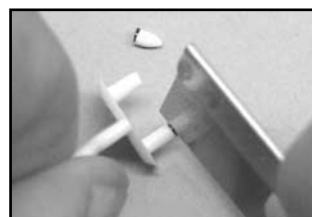
b) Hold the control horn in correct location on the aileron and when you have it in the correct position, press down so the pegs on the bottom of the horn puncture through the covering and make a mark on the balsa aileron.

c) Drill a 1/16" dia. pilot hole into the aileron at both marked locations. Do not drill completely through the aileron, just far enough to accept the control horn pegs.

d) Use a sharp knife to remove the small strip of covering material between the two holes. Then, glue the nylon control horn in place using thick CA glue. Apply a small amount of glue to the two pegs and a small amount of glue to the bottom of the control horn base itself. Firmly press the horn into the two pre-drilled holes in the aileron, until the base bottoms out on the surface. If any glue oozes out onto the covering, it can be easily removed with SIG CA Debonder.

e) Repeat this process to mount the other aileron control horn.

❑ 7) In preparation for installing the aileron pushrods, center the aileron servo output arms in neutral position. Also, secure the ailerons in neutral position with small pieces of tape.

a) Working on one aileron at a time, slide one of the nylon pushrod keepers over the plain unbent end of the aileron pushrod wire.

b) Insert the Z-bend end of the aileron pushrod wire into the outermost hole of the servo output arm (if the holes in your servo arm are too small for the wire, drill out the holes with a #60 or 3/64" dia. drill bit).

c) Hold the pushrod wire against the side of the nylon control horn and use a fine tip pen to mark the exact position of the control horn hole on the wire. NOTE: The wire will be installed in the 2nd hole from the end of the horn.

d) Use a pair of pliers to grasp the pushrod wire at the mark just made, and then bend the plain end of the wire 90° towards the center of the wing. Make the bend as sharp as possible.
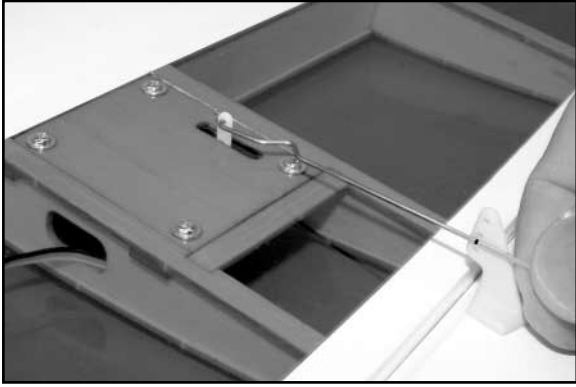
e) The excess length of pushrod wire can now be cutoff, leaving a 3/16" end leg to pass through the control horn hole. Use a good sharp pair of wire cutters to do this. Clean off any burs on the end of the wire, caused by the cutting.

f) Insert the bent end of the pushrod wire into the hole in the control horn. Slide the nylon pushrod keeper up to the control horn and snap its tab end over the exposed wire on the opposite side of the control horn.
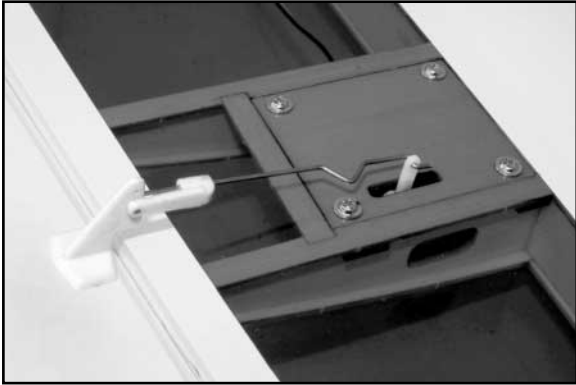
g) Remove the pieces of tape holding the aileron in neutral position.

h) Repeat these steps to bend and install the other aileron pushrod on the other side of the wing.

NOTE: Later, when you turn on your full radio system for the first time, you may find that the length of the aileron pushrod wires did not come out exactly perfect, leaving the ailerons slightly out of neutral position. If so, you can make small corrections to the overall pushrod length by tweaking the V-shaped adjustment bend that is provided in the pushrod wire.

TAIL SURFACES AND TAILWHEEL
For this section you will need the Fuselage, the Stabilizer/Elevator Assembly, the Fin/Rudder Assembly, the Tailwheel Assembly, and (2) Nylon Control Horns.

❑ 8) Hold one of the white plastic control horns up against the edge of the elevator. Use a fine tip pen to mark the two pegs on the base of the control horn for cutting off just below the top covering of the elevator. Then, use a sharp razor blade or hobby knife to cut off the pegs at the marks.
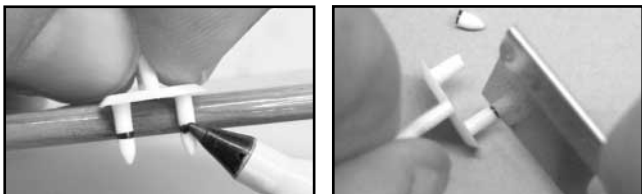

❑ 9) Note that the bottom of the stabilizer is the side without any white covering. Mount a nylon control horn on the bottom of the RIGHT elevator, as follows:

a) Two holes are pre-drilled in the right elevator, under the covering material, for the control horn mounting. Puncture the covering material directly over these two holes, on the BOTTOM of the elevator only, to accept the two pegs of the control horn.

b) Use a sharp knife to remove the covering material around the two holes, where the control horn will sit.

c) Glue the nylon control horn in place on the BOTTOM of the elevator, using thick CA glue. Apply a small amount of glue to the two pegs and a small amount of glue to the bottom of the control horn base itself. Firmly press the horn into the two pre-drilled holes in the elevator, until the base bottoms out on the elevator surface. If any glue oozes out onto the covering, it can be easily removed with SIG CA Debonder.


BOTTOM OF RIGHT ELEVATOR
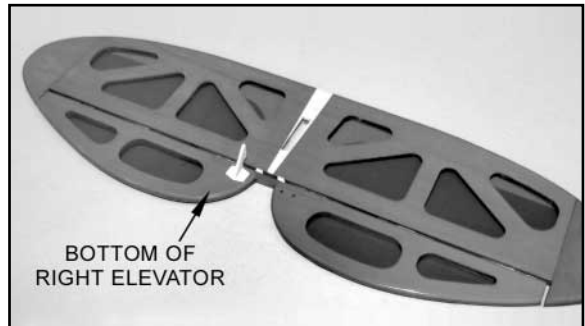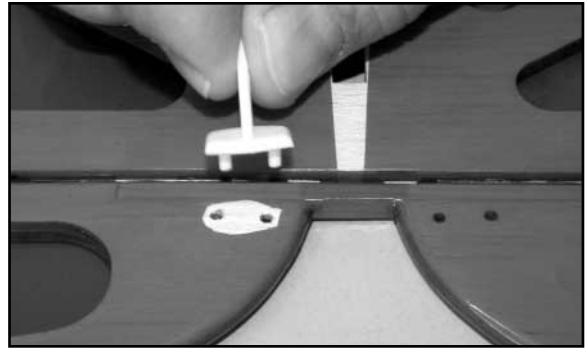
❑ 10) Next the horizontal stabilizer/elevator assembly will be glued permanently onto the fuselage. To allow enough time to properly align the stabilizer, we recommend using slow drying SIG Epoxy Glue for this step.

a) First mount the wing onto the fuselage. Place the model on a flat surface that lets you view it directly from the front.

b) Set the stabilizer in place on the fuselage. Use a small weight or pins to hold the stabilizer in position. View the model from the front to see if the stabilizer is properly aligned with the wing and fuselage, without tilting to one side or the other. If necessary, take the stabilizer back off and make slight adjustments to the fuselage where the stabilizer sits, with a sanding block, until the stabilizer will sit level.

"X" = SAME ON BOTH SIDES

c) Remove the stabilizer. Mix a small amount of epoxy glue and apply it to the mating surfaces of the fuselage and bottom of the stabilizer. Carefully place the stabilizer back on the fuselage. Again, use pins or a small weight to hold it in perfect position. Make sure the stabilizer is square with the fuselage by measuring from the trailing edge of the wing back to the trailing edge of the stabilizer, on both sides. Shift the stabilizer slightly if necessary until both measurements are the same. Wipe off any excess glue using a paper towel or rag soaked in rubbing alcohol. Allow the glue to dry thoroughly before unpinning.
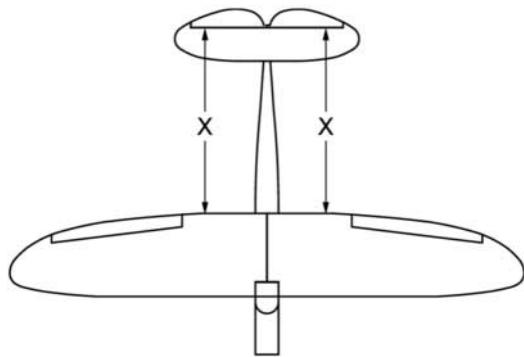
"X" = SAME ON BOTH SIDES

❑ 11) Note that the fin and rudder are hinged together, but the hinges are not glued. Pull the fin and rudder apart and set the rudder aside for now, while we glue the fin in place on the fuselage.

a) Test fit the fin on the fuselage to get familiar with its proper location. The back edge of the fin should line up perfectly with the back end of the fuselage.

b) Carefully remove the covering from the top of the fuselage where the front of the fin will set. Use a new sharp blade and be careful not to cut into the wood of the fuselage.

REMOVE COVERING
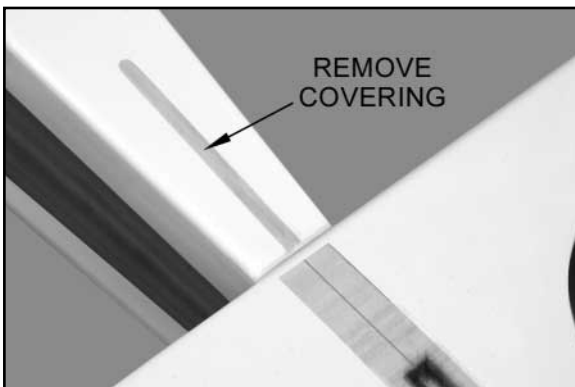
c) Glue the fin in place on the fuselage, being careful to line it up squarely and perpendicular to the stabilizer. Let dry.
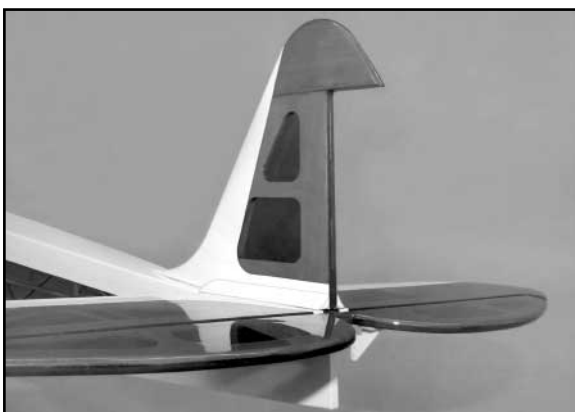
❑ 12) Glue the tailwheel assembly in place in the leading edge of the rudder.

❑ 13) Mount a nylon control horn on the left side of the rudder.

a) Shorten the pegs on the bottom of the control horn like you did for the elevator horn back in Step 8.

b) Two holes are pre-drilled in the bottom of the rudder for the control horn mounting. The holes are underneath the white covering and a little hard to see, but if you press down firmly on the covering material with your finger, and then look very closely, you should be able to find the location of the holes. Once you have located them, puncture the covering material directly over the holes, on the LEFT side of the rudder only.

c) Use a sharp knife to remove the covering material around the two holes, where the control horn will sit (see photo back in Step 9 of the elevator horn mounting).

d) Glue the nylon control horn in place on the LEFT of the rudder with thick CA glue. Apply a small amount of glue to the two pegs and a small amount of glue to the bottom of the control horn base itself. Firmly press the horn into the two pre-drilled holes in the rudder, until the base bottoms out on the rudder surface. If any glue oozes out onto the covering, it can be easily removed with SIG CA Debonder.

❑ 14) The rudder can now be permanently hinged onto the back of the fin and fuselage.

a) Start by taking a hobby knife and making a single slit in the rear end of the fuselage, just below the stabilizer, where the bottom rudder hinge will go.
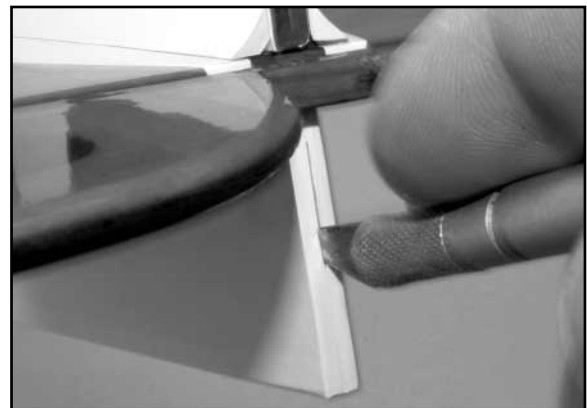
b) Insert the three CA hinges into the leading edge of the rudder. Push them in halfway.

c) Now carefully slide the exposed half of the hinges into the slots in the back of the fin and fuselage. You will find it easiest to insert the hinges at angle, one hinge at a time, instead of trying to push all three of them straight in at once. Try to keep the hinges approximately halfway into each part, but don't be overly concerned if they aren't perfectly straight and centered in the slots - close is good enough.

d) To set the proper amount of gap between the Fin and Rudder, simply deflect the Rudder to the maximum amount of travel needed. This will automatically set the proper hinge gap! Keep
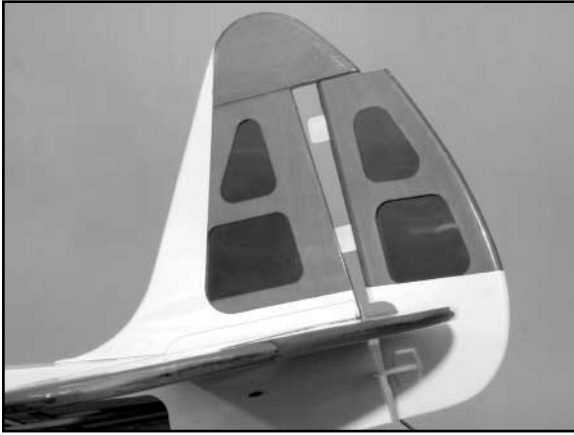
in mind that for best control response the gap should be kept as small as possible, but big enough to allow full movement of the control surface. Make sure everything is functioning properly before proceeding to the next step.

e) Carefully place three or four 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. Turn the part over and glue the other side of the hinge. Continue this process until you have glued both sides of all three 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). Let the glue dry a minimum of 5 minutes before flexing the hinges.

VERY IMPORTANT: It's critical that you only make one application of glue to each side of a CA Hinge. If you apply additional glue to the hinge after the first application of glue is already dry, the second application of glue will merely puddle in the hinge gap and make the hinge too stiff to operate properly. When properly glued, the portion of the hinge that you can see in the hinge gap should have a dry appearance, not wet. Two to three good size drops of Thin CA should be about the right amount. NEVER USE CA ACCELERATOR ON CA HINGES!

❏ 15) Screw the Brass Bearing Plate of the tailwheel assembly in place on the bottom of the fuselage, using the (2) M2 x 8mm PWA Screws provided. Drill pilot holes first.


ELEVATOR & RUDDER HOOKUP
For this section you will need the Fuselage, (2) Servos, (2) Long Formed Wire Pushrods, and (2) Nylon Pushrod Keepers.

❏ 16) Mount the elevator and rudder servos in the fuselage, using the screws that came with the servos.

a) Begin by positioning the servos in place in the plywood servo tray built into the fuselage. Make sure the ends of the servo arms line up with the plastic pushrod tubes already installed in the fuselage.

b) Once you have the servos correctly positioned, drill small pilot holes through the plywood for each servo mounting screw. We used a small pin vise and a .040" (#60) drill bit to make these pilot holes. Then, use a small screwdriver to install the servo mounting screws.
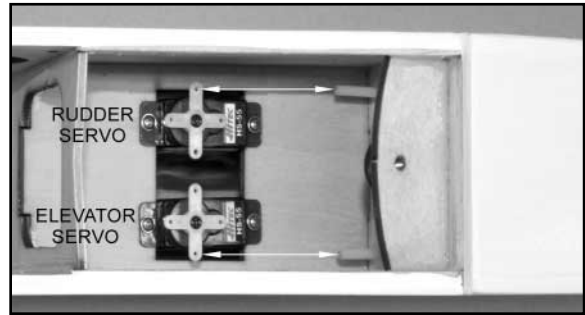
❏ 17) Study the following photo to become familiar with the installation of the formed pushrod wires. Notice that the Z-bend in the end of the pushrod will be installed down through the top of the servo arm.

a) Now slide the pushrod wires inside the appropriate plastic pushrod tubes in the fuselage.

b) Remove the servo arms from the servos. Install the servo arms on the Z-bend ends of the pushrod wires (if the holes in your servo arm are too small for the wire, drill out the holes with a #60 or 3/64" dia. drill bit). Then, reinstall the servo arms back onto the servos. Do not tighten the servo arm screws completely yet because the arms may have to be repositioned when the radio system is tested and centered.
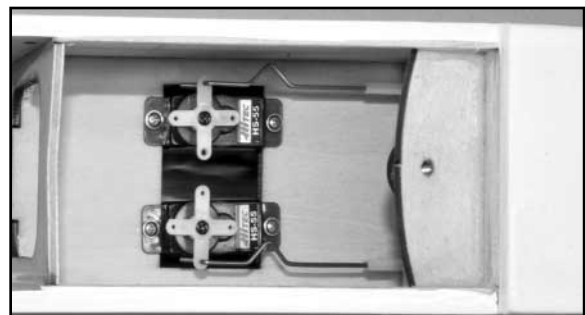
❏ 18) Next step is to complete the aft end of the rudder pushrod. Start by centering the rudder servo output arm in neutral position. Use small pieces of tape to hold the rudder in neutral position.

a) Slide one of the nylon pushrod keepers over the aft end of the rudder pushrod wire.

b) Hold the rudder pushrod wire against the side of the nylon control horn and use a fine tip pen to mark the exact position of the control horn hole on the wire. NOTE: The wire will be installed in the middle hole of the control horn.
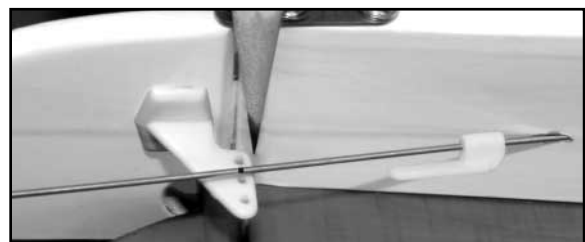
c) Use a pair of pliers to firmly grasp the pushrod wire at the mark just made, and then bend the plain end of the wire 90° DOWNWARDS (so that the pushrod wire comes into the control horn from the top - see photo below). Make the bend as sharp as possible.

d) The excess length of pushrod wire can now be cutoff, leaving about a 3/16" end leg to pass through the control horn hole. Use a good sharp pair of wire cutters to do this.

e) Insert the bent end of the pushrod wire in the hole in the control horn, from the bottom. Then, slide the nylon pushrod keeper up to the control horn and snap its tab over the exposed end of the pushrod wire.

f) Remove the tape holding the rudder in neutral position.
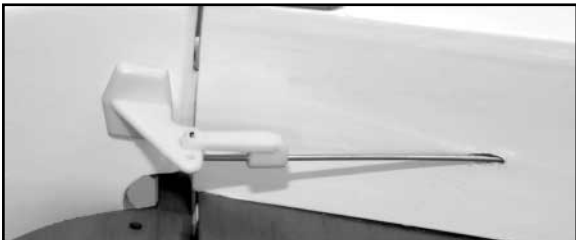
g) Repeat Step 18 to complete the aft end of the elevator pushrod. Note that this pushrod is installed in the bottom hole of the control horn.

NOTE: Later, when you hook up and turn on your full radio system for the first time, you may find that the length of the elevator and rudder pushrods did not come out exactly perfect, leaving the control surface slightly out of neutral position. If so, you can make small corrections to the overall pushrod length by slight tweaking of the "V-shaped adjustment bend" that is near the servo end of the pushrod.

MAIN LANDING GEAR
For this section you will need the Fuselage, formed Main Landing Gear Wire, (2) Main Wheels, Landing Gear Spreader, Left Wheel Pant, Right Wheel Pant, (2) Wheel Pant Mounting Straps, and (4) M2 x 5.5mm PWA Screws.

❏ 19) The main landing gear wire is now glued in place in the fuselage. We prefer 5-minute epoxy glue for this step.

a) First test fit the landing gear wire in place in the fuselage, sliding the top of the wire into the slots built inside the fuselage to receive it. The wire should slide in easily, all the way in until it bottoms out in the slots.

b) Remove the gear from the fuselage and use coarse sandpaper to sand the wire everywhere it will contact the fuselage sides. Then wipe the wire clean with a rag soaked in rubbing alcohol or paint thinner. This will improve adhesion of the glue.

c) Apply 5-minute epoxy into each landing gear slot on the inside of the fuselage - just enough to fill the slots. Once again slide the landing gear wire in place into the fuselage. Carefully wipe off any excess glue with a rag soaked in rubbing alcohol. Let dry.

❏ 20) Epoxy the covered plywood landing gear spreader in place on the bottom of the fuselage, between the wire landing gear legs. Glue it everywhere it contacts the fuselage - on both ends and long the front edge. Wipe off any excess glue with a rage soaked in rubbing alcohol. Let dry.


❏ 21) Look inside the wheel pants for the built-in plywood mounting plates. This is how you identify which wheel pant goes on the RIGHT side of the airplane and which goes on the LEFT side. The plywood plates must be on the side of the wheel pant that is up against the landing gear wire.


a) The wheel pants must first be correctly aligned to the fuselage, before mounting. This is done by slipping the wheel pants in place over the landing gear wires (without installing the wheels) and then propping the rear of the fuselage up 3" off of a flat surface. With the wheel pants sitting on their flat bottoms, this provides the correct side view alignment for the next step.

Wheel pants are sitting flat on the workbench
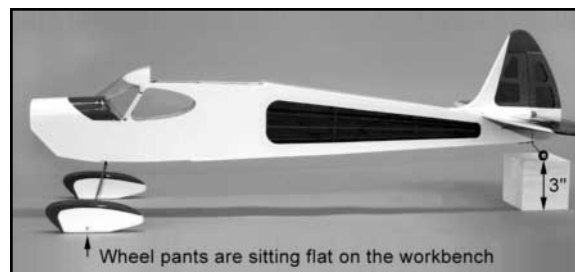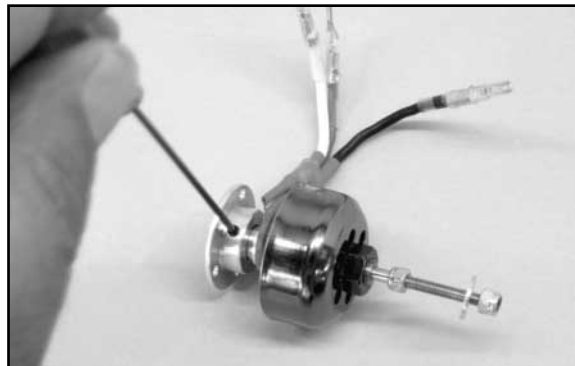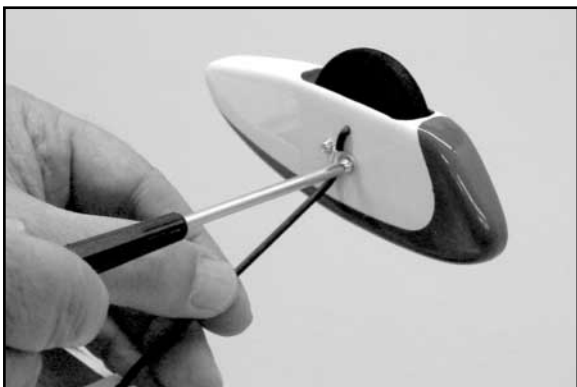
b) Press one of the metal wheel pant mounting straps in place on one of the wire landing gear legs, up tight against the wheel pant. Slide the strap up or down on the wire until the bolt holes are approximately 3/8" above the axle hole. Use a sharp pencil to mark the location of the mounting strap's two bolt holes onto the wheel pant. Do the same for the other wheel pant.
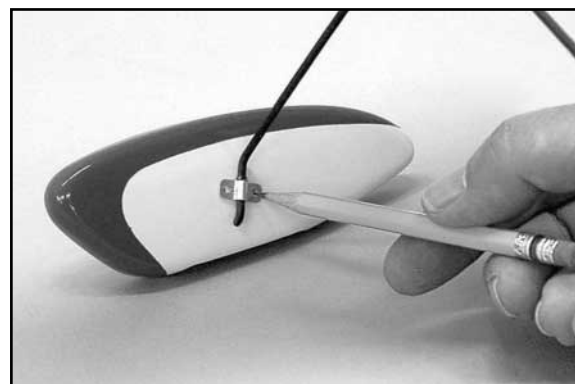
c) Remove the wheel pants from the axles. Drill .046" dia. (3/46" or #56 bit) pilot holes completely through the wheel pant wall and the plywood pad inside, at the marks just made.
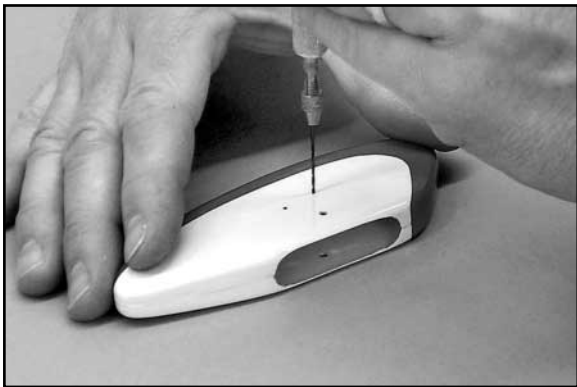
❏ 22) Assemble the wheel pants and wheels simultaneously onto their axles, using the M2 x 5.5mm screws provided.

MOUNTING THE MOTOR & SPEED CONTROL
For this section you will need the Fuselage, the Brushless Electric Motor, the Speed Controller (ESC), (3) M2 x 6mm PWA Screws, and a portion of the "Hook-&-Loop Tape" (Velcro®).

❏ 23) Prepare the motor shaft to accept the propeller. In the small parts bag that came with the Motor and ESC, locate the (2) M3 Lock Nuts and (1) M3 Flat Metal Washer. Thread one of the lock nuts onto the motor shaft in reverse direction - plastic insert first, leaving the hex end pointing forward. Thread this nut all the way onto the shaft until you run out of threads, as shown. After that, slip the flat washer onto the motor shaft, and then screw the remaining lock nut onto the end of the shaft - with it's hex end going on first. The propeller will be put on later. The other hardware in the small parts bag is not needed for this installation.

❏ 24) There are two small set screws holding the motor mount on the back of the motor shaft. Use a 1.5mm hex wrench or ball-driver to loosen the two set screws far enough to allow you to pull the mount off of the shaft.
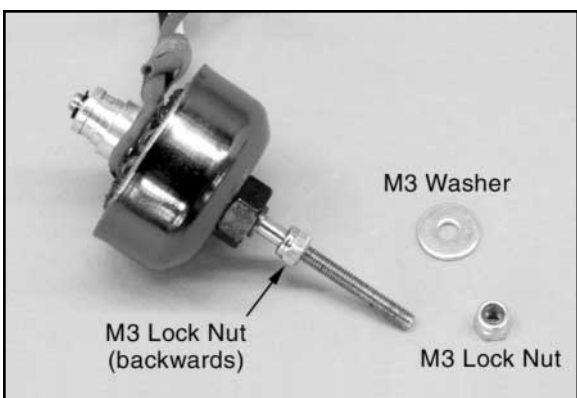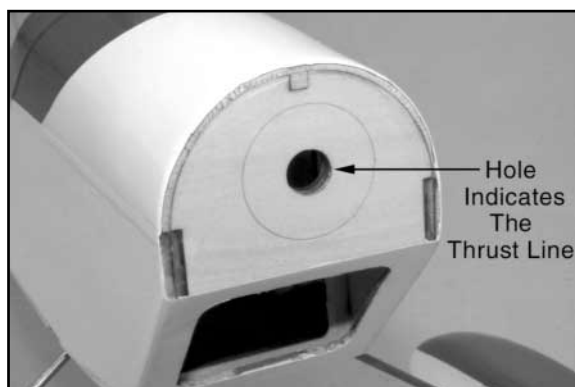

❏ 25) Using (3) M2 x 6 mm PWA Screws, mount the aluminum motor mount to the firewall.
    a) First mark the locations for the three mounting screws on the face of the firewall. Notice that there is a 5/16" dia. hole in the firewall, which marks the proper thrust line for the motor. Note that there is also a larger circle etched into the firewall, centered on the 5/16" hole. The etching represents the outer diameter of the supplied motor mount. Hole the motor mount in proper location on the firewall and mark the screws positions with a pencil.
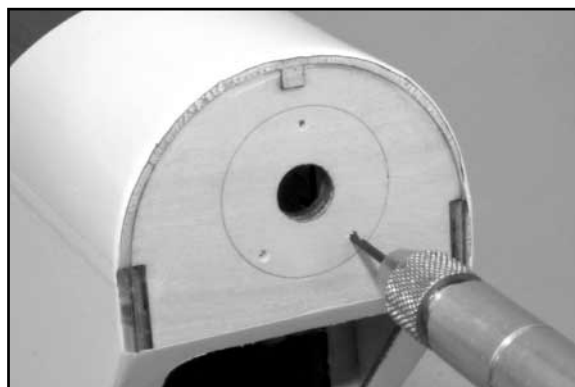

Hole Indicates The Thrust Line

    b) Drill .046" dia. (3/46" or #56 bit) pilot holes completely through the firewall at the marks just made.

    c) Screw the motor mount to the firewall with the three M2 x 6 mm PWA Screws. After running the three screws fully in place

the first time, we suggest removing them and "hardening" the threads in the plywood with a drop of thin CA glue. Once the glue has set, put the mount back in place and tighten the screws firmly.
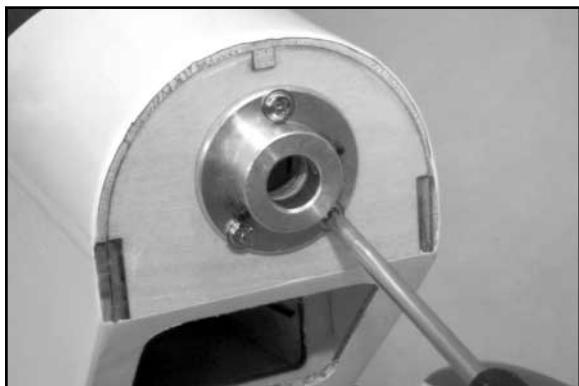
❏ 26) Reinstall the brushless motor into the motor mount. Insert the back end of the motor shaft into the mount, and then use a 1.5 mm wrench to tighten the two set screws.

❏ 27) Before the ESC is installed, the red (positive) and black (negative) battery wires coming out of the ESC must have a proper battery plug installed. The battery plug is not included in this kit - there are various types available, so it is a matter of personal preference. We like to use the "Deans Ultra" plug, as shown.
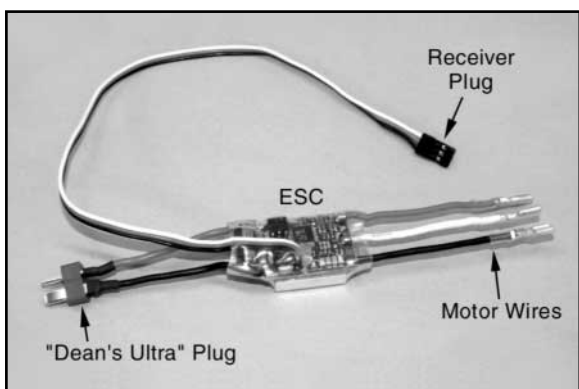
Solder the battery plug on to the red (positive) and black (negative) wires of the ESC, being mindful of the polarity. Solder the mating connector to your flight pack battery, again being careful to get the polarity correct.

❏ 28) Connect the ESC up to the motor - red wire to red wire; white to white; black to black. Later, when running the motor for the first time, if you find that the motor is turning in the wrong direction, simply switch two of the wires to change the direction of rotation.

❏ 29) Mount the ESC inside the nose compartment of the airplane. Use a section of the supplied sticky-back "Hook-&-Loop Tape" (Velcro®) to hold the ESC in place. We mounted our ESC up high on the right fuselage side, as shown in the next photo.


RECEIVER & BATTERY INSTALLATION
For this section, you will need the remainder of hook-and-loop tape, your receiver, the aileron Y-Harness, and a charged flight battery pack.

❏ 30) You can mount the receiver either on the top or bottom of the plywood cabin floor, using a piece of hook-and-loop tape to keep it in place. We mounted ours on the bottom.

❏ 31) Plug the aileron Y-harness into the aileron slot of your receiver. Plug the elevator and rudder servo leads into their correct slots. Also plug the ESC into the throttle slot in the receiver. (Your radio manual will tell you which slots to use in your receiver).
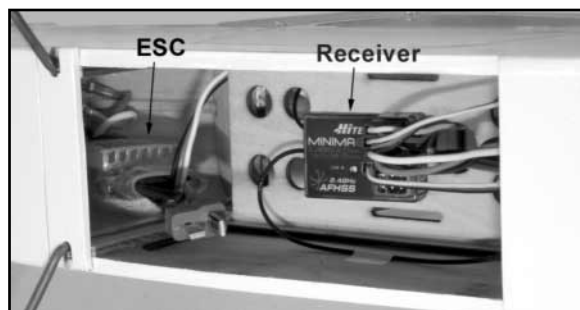
❏ 32) Exactly where you should locate your battery pack will depend on the final balance of your airplane. Every airplane (especially balsa wood models) can vary in balance. You won't know exactly where to put your battery pack until the airplane is completed, and you check the final balance on page 14 of this manual.

There is plenty of room inside the Rascal EP-49 fuselage to accommodate practically any balance situation. The battery pack can go all the way forward against the back of the firewall, or back in the cabin behind the landing gear (in which case you would relocate the receiver to the top of the plywood cabin floor. In most cases we believe you will find, like we did, that the battery pack will end up on the floor of the nose compartment, as shown in the next photo. Use a section of hook-&-loop tape (Velcro®) to hold it in place during flight. Make sure that the battery plug is in position to be easily plugged into the ESC.
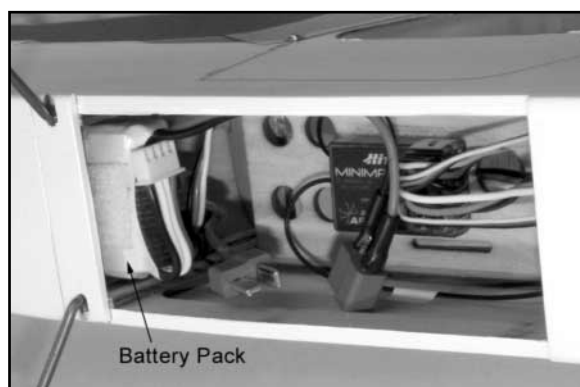
SYSTEM TESTS

The completed radio and motor systems can now be powered up, then tested and adjusted for proper operation. Note that the wing and propeller are NOT yet installed at this point.

❑ 33) Make sure the aileron, elevator, and rudder trim levers on your transmitter are each in neutral position and that the throttle stick is in the full "low throttle" position.

a) Turn on your transmitter. NOTE: The transmitter MUST ALWAYS be turned on first and turned off last!

b) Plug the battery pack into the ESC. You will hear an audio tone from the ESC, indicating that is recognizing the signal from the transmitter.

c) The elevator and rudder servos should now be working. If necessary, reposition the servo output arms on the elevator and rudder servos as close to 90º to the servo case as possible. Be sure to reinstall the output arm retaining screws after making the adjustment.

d) Move the elevator stick on the transmitter to check for the correct direction of elevator movement. If necessary, use the servo reversing feature in your transmitter to reverse the direction. Repeat this same procedure for the rudder servo.

e) With the rudder and elevator servos now moving in the correct directions, check the neutral positioning of the rudder and elevator surfaces. If needed, adjust the V-bend in the pushrods to properly center these surfaces.

❑ 34) Set the wing in place on the fuselage, plugging the aileron servo chords into the Y-Harness in the fuselage.

a) With the radio on, check the position of the aileron servo output arms. If necessary, reposition the arms as close to 90º to the servo case as possible. Be sure to reinstall the output arm retaining screws after making the adjustment.

b) Move the transmitter aileron stick and check for correct direction of aileron movement. If needed, use the servo reversing feature in the transmitter to reverse the direction.

c) With the aileron servos now moving in the correct directions, check the neutral position of the ailerons. If needed, adjust the V-bend in the pushrods to properly align both ailerons in the neutral position.

❑ 35) For safety, the propeller and spinner should NOT be installed on the motor for this step, which is the first test of the power system.

a) Slowly advance the throttle stick on the transmitter. The motor should start turning. If not, perhaps your throttle channel needs to be reversed on the transmitter. If this is the case, unplug the flight battery first, and then reverse the throttle direction in your transmitter. To continue, plug the battery back into the ESC.

b) Again slowly advance the throttle stick. The motor should begin turning in proportion to the amount of throttle stick movement. Now, make sure the motor shaft is moving in the correct direction. When viewing the fuselage from the rear to the front - as if you were sitting in the cockpit - the motor shaft should turn clockwise, when throttle is applied. If your motor is turning in the wrong direction, double check that you have the red, black, and white wires from the motor to the ESC plugged in correctly. If they are correct (red to red, black to black, white to white), and the motor still turns the wrong direction, simply switch two of the wires to change the direction of rotation (make it red to black, and black to red).

CONTROL SURFACE TRAVEL

❑ 36) The maximum distance that a control surface moves when you move the transmitter stick to full deflection is normally called the control surface "travel" or "throw". Most modern radio systems allow you to adjust the control travel of the servos directly from the transmitter. This radio feature is usually referred to as EPA (meaning End Point Adjustment). Use this feature to adjust the control surface travel for the ailerons, elevator, and rudder of your RASCAL EP-49. The following control travel measurements are recommended for your initial test flights of the airplane.

NOTE: Control surface travel measurements are always taken at the widest part of the control surface, at the trailing edge.

## RECOMMENDED CONTROL SURFACE TRAVEL
Ailerons: 5/16" Up - 5/16" Down
Elevator: 3/8" Up - 3/8" Down
Rudder: 1/2" Right - 1/2" Left

COWLING & COOLING

❑ 37) From the kit contents, locate the plastic Cowling and (4) M2 x 6 mm PWA Screws.

a) Slide the cowling in place over the motor and onto the front of the fuselage. Use pieces of tape to secure the cowling in place, centered with the motor, with the front of the cowling about 1/4" behind the front face of the 3.5 mm lock nut on the motor shaft.
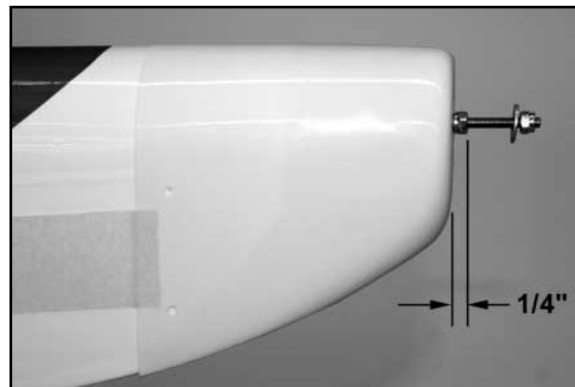
b) Use a sharp pencil or a pointed object, such as an awl, to mark or punch a centered mark in one of the cowl mounting holes. Use a small (.040") dia. bit to drill a pilot hole through the fuselage side at the mark just made. Use a screwdriver to install one of the M2 x 6 mm PWA Screws into the drilled hole.

c. Re-check the placement of the cowling to make sure it hasn't shifted, and then again use a sharp object to mark the center of the opposite cowl mounting hole. Drill a pilot hole and install another mounting screw in this hole.

d. Repeat this process until all four mounting screws are in place. Then remove the tape.
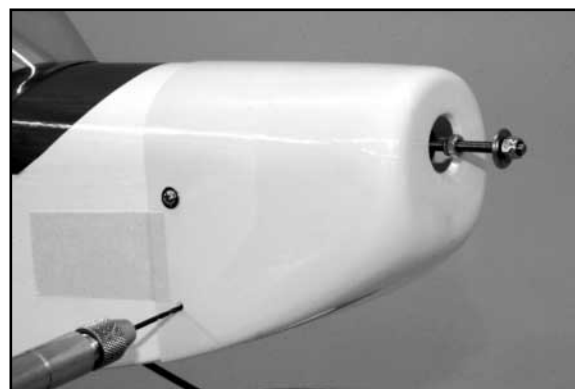
e) Remove the cowling and harden the holes in the fuselage side with a drop of Thin CA. Let dry completely.

❑ 38) In order to properly cool the motor, ESC, and battery pack in flight, we need to let some air flow into the cowling. This is done by making one (or more) holes in the front of the cowling. The exact shape and location of the hole(s) is not critical. Here are two different styles of intake air holes that we have used on this airplane.

Style 1: On one of our prototype models we cut three 1/8" x 1-1/4" slots in the front slope of the cowling, as shown in the next two photos. The slots are spaced 3/8" apart. You can use a Dremel® tool, or a simple hobby knife to make the slots. Finish the edges of the slots with fine sandpaper.
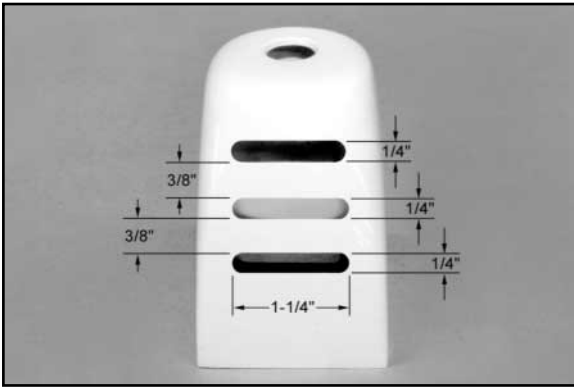
Style 2: On a second prototype we simply enlarged the hole in the front of the cowling, where the motor shaft comes through, to 1-1/4" diameter. This is slightly larger than the motor spinner and will let in sufficient air to cool the power system.
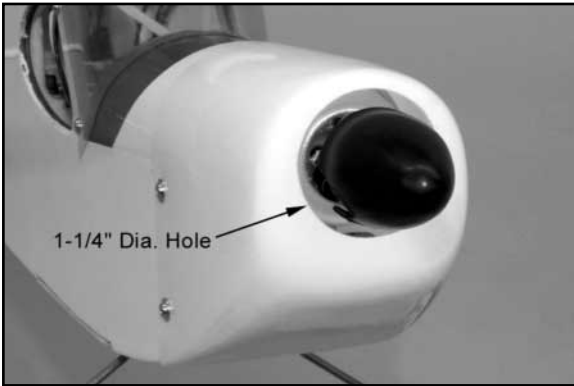
❑ 39) Once the air gets inside the cowling it needs somewhere to exit. Take a close look at the balsa battery hatch and you will see that it has 3 holes already cut in it, but the holes are covered over with white covering material. Take a sharp hobby knife to cut away the covering over the holes. This will complete the cooling air path. The air can now flow into the cowling, through the opening in the lower front of the fuselage under the cowl, and then exit through three holes in the battery hatch, keeping a steady flow of cooling air over the entire power system.


MOUNTING THE PROPELLER & SPINNER

❑ 40) Locate the Propeller with Brass Hex Nut and Aluminum Sleeve, plus the rubber Spinner from the kit contents.

a) Remove the front M3 lock nut and the washer from the motor shaft. Then thread the Brass Hex Nut that came with the propeller onto the motor shaft. Thread it all the way back, up tight against the rear lock nut. Tighten it securely. (If you have some Locktite® thread locking compound, put a drop between the two nuts before you tighten them together.)
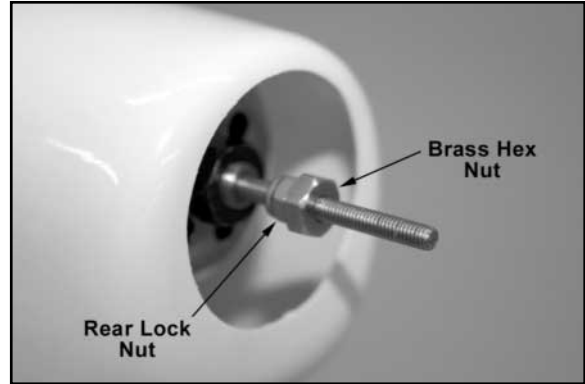
b) A short section of aluminum tubing is provided with the propeller to sleeve down the hole in the prop hub to the same diameter as the prop shaft. Press the aluminum sleeve into the center hole of the prop, as shown. It's a tight fit, but it will go in.
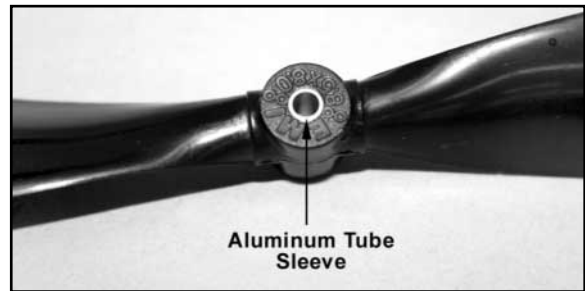
c) Next slide the propeller in place onto the motor shaft. Notice that the backside of the propeller hub has a hex shaped recess the same size as the brass hex nut. Slide the propeller all the way back, pressing it over the brass nut.

d) Place the flat metal washer back on the motor shaft, and then thread the front lock nut in place against the washer and the propeller. Tighten the nut securely.
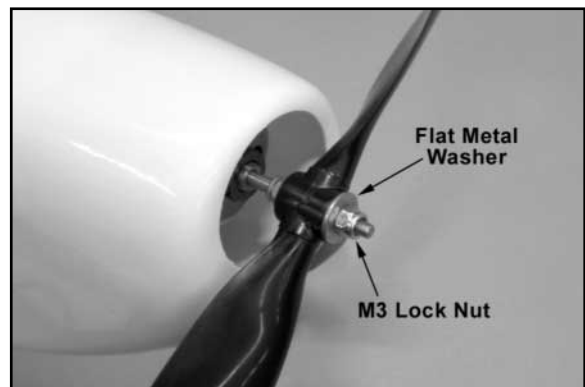
SAFETY WARNING: With the propeller mounted to the motor, it is very important that you always be aware of the position of the throttle stick on your transmitter whenever you plug the battery pack onto the system, making the system "hot". The motor used in this model is powerful enough to cause damage to people or property if it is activated prematurely, accidentally, or unexpectedly. With an electric airplane, we recommend that you get in the habit of always keeping the throttle stick in the "low throttle" posi-

tion, even when the transmitter is in storage. Be sure to recheck the throttle stick position before plugging in the battery pack. Under no circumstances should you hold this model by the nose when the battery is plugged in. Never plug your battery pack onto the system until; 1) your transmitter is ON with the throttle stick in the low position, and 2) you are on the flight line, ready to fly.

SIDE WINDOW INSTALLATION:
From the contents of your kit, locate the molded side windows. Use scissors to cut out each window, leaving about 1/8" of plastic around the edges for a gluing surface. We suggest using 5-minute epoxy or RC-56 glue to mount the windows into the inside of the fuselage. DO NOT use thin CA glue for this step! Apply a thin bead of glue to these edges and press the window in place from the inside of the fuselage. Use small pieces of tape to hold the windows in place until the glue sets.
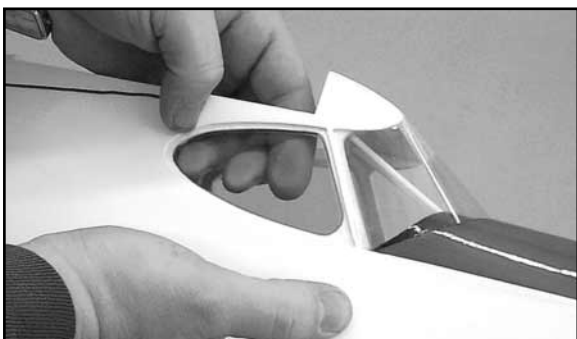
DECAL APPLICATION
The decals supplied with the RASCAL EP-49 are stickers with a self-stick adhesive back. They are not water slide decals. Also, these decals are not die-cut. Each design must be cut from the sheet with a sharp #11 hobby knife or a sharp scissors.

Small decals can be easily applied to the model by simply removing the paper backing sheet, and then, laying the decal in position and pressing it in place with your finger.

For the larger decals, such as the "RASCAL EP-49" wing decal, we suggest the following "wet" method of application:
   a) Carefully cut out the decal with a hobby knife.
   b) Peel the paper backing sheet completely off the decal, being careful not to let the sticky side double over and adhere to itself.
   c) Use a product like SIG Pure Magic Model Airplane Cleaner, Fantastic®, or Windex® to spray the adhesive side of the decal. Also, spray the area of the model that will receive the decal.
   d) Lightly place the decal onto the wet surface of the model. The liquid cleaner solution will keep the decal from actually sticking to the model until you have had time to shift it around into exact position. Once in position, use a piece of stiff cardboard (or sheet balsa, thin plywood, or a SIG SH678 EPOXY SPREADER) to squeegee the excess liquid out from under the decal. Squeegee repeatedly, removing all excess liquid and any air bubbles. Mop up the liquid with a paper towel. Allow to dry overnight.
   e) When completely dry, wash off any soapy smears with a soft clean wet rag.

BALANCE YOUR AIRPLANE
IMPORTANT: An R/C model should always be balanced with everything on board, ready for flight. The flight battery must be installed in the fuselage and the propeller and spinner must be mounted in place when balancing the model.

Because the RASCAL EP-49 is a relatively small and light airplane, the single most effective adjustment you can make to achieve correct balance is the weight of the battery pack and its location. As mentioned in the beginning of this manual, we recommend 3S1P lithium-polymer (lipo) battery packs in the 850-1400 mAh range. The difference in weight between these two size battery packs can be as much as 1-1/2 ounces, making it an effective balancing tool. Battery packs in this range all provide plenty of flight time, so we chose the pack that best balanced our individual airplane. We suggest that you do the same thing.

<div align="center">

RECOMMENDED BALANCE POINT
2" to 2-5/16"
Behind The Leading Edge Of The Wing
At The Fuselage Sides

</div>

Notice that the rear face of the main wing spar of the RASCAL EP-49 is at the rear limit of the balance range. The simplest way to check the balance of your RASCAL EP-49 is to place a fingertip, one on each side of the fuselage, at the main spar location on the bottom of the wing. Slowly lift the airplane off the worktable and note the attitude of the fuselage. The airplane should balance on your fingertips in level position - not nose up or nose down. If the nose hangs low, the model is "nose heavy". If the tail hangs low, this means that the model is "tail heavy". If either of these conditions exists, you must make adjustments to correct the problem. Never attempt to fly a model that is out of balance! Since the battery pack is the single heaviest component in the airplane, it can be used to adjust almost any tail heavy or nose heavy condition. This is simply done by moving the battery forwards or backwards inside the airplane, and/or going to a lighter or heavier battery pack.

FLYING YOUR RASCAL EP-49
The RASCAL EP-49 appeals to R/C fliers of all experience levels -from beginners to expert pilots. Assuming that the expert pilots will not need much guidance, these flying notes are written for the R/C newcomer.

PRE-FLIGHT
Be sure your flight battery pack is fully charged. Also, be sure your transmitter is fully charged. We highly recommend that you perform a standard range check on your radio system - with and without the motor running. Make sure your propeller is balanced and has no nicks or cracks - never fly with a faulty propeller! Finally, take a few minutes to give your model a thorough pre-flight inspection. Make sure everything is secure and tight and operating properly, before attempting to fly the model. Any problems you have will not magically disappear in the air - they will get worse!

AN INSTRUCTOR CAN SAVE YOUR AIRPLANE!

If you are new to the hobby of flying R/C model airplanes, DO NOT attempt to fly this model by yourself! We strongly urge you to seek the help of a competent flight instructor. There are hundreds of R/C clubs in the U.S. and these clubs normally have designated instructors, who are eager to help newcomers. The easiest way to find an R/C flying club in your area is to ask your local hobby shop or check the AMA (Academy of Model Aeronautics) web site: www.modelaircraft.org .

An R/C flight instructor serves two important functions. First, he will test fly your new airplane to make sure it is performing correctly, before you try to fly it. These first flights are called "trim flights". During these flights, the flight instructor will "trim" the model from the transmitter to ensure that it flies straight and level without any problems. When a brand new R/C model takes off for the first time, there is no way of knowing which way it might go. Some models will try to climb, while others may want to go down. Some will try to turn left, others right. Some models will be doing both at the same time! It doesn't mean that there is anything wrong with the model, but these minor differences must be "trimmed out" in order for the model to fly "hands-off" straight and level. An experienced pilot can instantly correct out of trim conditions before the model crashes into the ground. An inexperienced beginner has almost no chance of saving an out of trim model!

The second reason for an instructor is to have someone there to correct the mistakes you will make during the learning process. It isn't that flying an R/C model aircraft is all that difficult. It is more a matter of learning what to do and when to do it. No matter how slowly a model flies, an incorrect control input can produce almost instant problems that, in turn, demand almost instant correction. This is especially true at lower flight altitudes. A good flight instructor will climb your model to an altitude that gives him a good chance of saving your airplane when you make these inevitable mistakes. This altitude is generally referred to as "2 mistakes high". When you get into trouble, quickly hand the transmitter back to your instructor so he can rescue the airplane. He will get it leveled off, and then, let you try it again. Without an instructor, it is very likely that you would not receive this second chance.

Beginning R/C pilots, almost always, over-control their models. This is perfectly normal but a trait that must be cured during instruction. Another problem common to beginners is disorientation. For example, when the airplane is flying away from you, right aileron input produces a right turn and left aileron input produces a left turn. However, when the airplane is flying directly toward you, the same right aileron input now makes the airplane turn to YOUR left. The airplane is still turning to it's right, but that is now your left side! This perceived control reversal is very confusing to all first time R/C pilots! Without an experienced flight instructor on hand, it will most likely cause the loss of the model.

With a flight instructor, these early learning problems can be easily dealt with. The more you fly, the quicker you will learn. Soon you will be flying "solo" with little thought of the moves required. It will start to come easy. Remember the first time you tried to ride a bicycle? It seemed completely awkward the first time, but once you learned how, it became easy. Don't get discouraged if you have a minor crack-up. Repair the damage and get back into the air as soon as possible.

FIRST TEST FLIGHT

Choose a calm day, with little or no wind, for the initial test flights. This is important in getting the model properly trimmed. If there is too much wind, you won't get a true reading on what the model is doing in the air.

The RASCAL EP-49 is capable of taking off from any smooth surface runway or a closely cut grass field - this is called an ROG (Rise-Off-Ground) take-off. The correct ROG take-off procedure is to line the airplane up with the center of the runway, facing directly into the wind. Advance the throttle smoothly to full high throttle position. As the airplane accelerates, apply a little right rudder input to counteract motor torque and keep the model tracking straight. When sufficient speed is attained, a small input of up elevator will get the model airborne.

The RASCAL EP-49 can also be easily hand-launched if the grass is too long at your flying field. When hand launching, the airplane must be launched, straight and level directly into the wind, with the nose aimed at a point on the ground about 75' in front of you. Never launch the model with the nose pointed up or the wings tipped to one side or the other. The launch should be firm enough to achieve flight speed, but yet, not overly hard.

Once the airplane is in the air, it should be flown to a reasonable altitude for flight trimming - approx. 100' or so. Flight trimming is the use of the transmitter trim levers to make fine adjustments to the position of the control surfaces, to make the model to fly straight and level when you momentarily remove your fingers from the control sticks. The ailerons, elevator, and rudder trim must all be adjusted carefully to achieve 'hands off" straight and level flight. Once the ailerons and rudder are properly trimmed, future re-trimming of them is usually rare. The elevator on the other hand can need re-trimming quite often, depending primarily on how fast you set your cruising speed. You will quickly learn that every time the throttle setting is changed, that of course changes the speed of the airplane, and then the elevator trim must also be re-adjusted to make the model fly level, instead of climbing or diving.

Depending upon the altitude of your flying field, the condition of your flight battery the amount of charge it is holding, and other factors, you will most likely find that the RASCAL EP-49 can easily cruise in level flight at 1/2 to 3/4-throttle setting. This reduced throttle setting will slow the model down, increase your flight duration, and make the model easier to fly for beginners.

Landing the RASCAL EP-49 is relatively easy. Flying into the wind, line up with the center of the runway and gradually throttle back. As the airplane slows down, the nose will drop, allowing the airplane to glide down to the runway. If the glide is too steep and the model is picking up speed, feed in a little up elevator until you get a shallow glide at a constant speed. About a foot or so above the ground, start to flare the landing by carefully feeding in more up elevator a little bit at a time. This will bring the nose up, slowing the airplane even more. Try to hold the airplane just inches off the ground until it finally slows enough to settle smoothly onto the runway.

Caution: Never land your airplane in tall grass or weeds with the motor running. Always throttle back completely if you land in such terrain or if you nose over after landing. Tall grass or a nose over will stall the electric motor if it is running. A stalled motor can overheat the ESC and batteries, causing them to fail.

GOOD LUCK AND HAPPY LANDINGS!

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.

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Muncie, IN 47302
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AMA WEB SITE: www.modelaircraft.org

CUSTOMER SERVICE

SIG MFG. CO., INC. is committed to your success in both assembling and flying the RASCAL EP-49 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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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.

If you like the Rascal EP-49, take a look at its "sister ship" - the Kadet EP-42B!

KADET EP-42B

KIT NO. SIGRC104ARF

ALMOST READY TO FLY

Electric Power R/C Trainer

Wingspan: 42 in.
Wing Area: 330 sq.in.
Length: 34 in.
Flying Weight: 24 - 26 oz.
Radio Req.: 4 Channel

Includes the same
Brushless Motor & ESC
as the Rascal EP-49