



NITRO RASCAL ARF ASSEMBLY MANUAL

INTRODUCTION:

Congratulations on the purchase of your SIG Nitro Rascal ARF kit! This model continues the great line of ARF Rascal kits, with their great looks and superb flight characteristics. The Nitro Rascal makes an almost perfect aircraft for those modelers looking for a maximum amount of 1/2A performance out of a great looking airplane. The Nitro Rascal ARF can be easily flown in smaller fields but is equally at home on normal club-size flying sites. The Nitro Rascal ARF was specifically designed to take full advantage of the great power and reliability of the Norvel .049, .061, or .074 glow engines.

Performance? You bet! The SIG Nitro Rascal ARF is a very capable airplane. It has a wide speed envelope from very quick at full throttle to a virtual "crawl" at low throttle. It is fully capable of a wide range of 3-channel aerobatics including beautiful rudder rolls, spins, inverted flight, snap rolls, touch and goes, etc. And the included 2-ounce fuel tank will allow you to enjoy 15 - 20 minute flights, depending upon fuel management. The kit also includes a great tail wheel assembly that provides excellent ground handling.

Like it's electric powered cousin, the Nitro Rascal is beautifully built from balsa wood and ply and expertly covered in premium Oracover® polyester film, using the signature "Rascal" two-color trim scheme. This also means that the covering on the Nitro Rascal ARF is easily repairable and easy to work with. Assembly is straight forward if you follow these instructions carefully. Deviating from these instructions has the potential to cause problems later in the assembly process or during flight. The successful assembly and flying of this model is *your* responsibility, so take your time and enjoy the process.

NITRO RASCAL ARF SPECIFICATIONS:

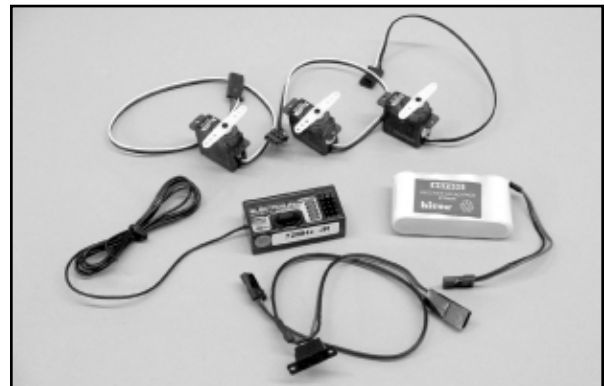
- Wing Span: 49"
- Wing Area: 324 sq. in.
- Length: 32.5"
- Flying Weight: 18 - 20 oz.
- Wing Loading: 8.0 - 8.8 oz./sq. ft.
- Engines: .061 - .074
- Radio Requirements: 3 Channels - 1 Micro Receiver & 3 Micro Servos Required

RADIO EQUIPMENT:

The Nitro Rascal ARF derives its performance from several factors. Two of these are its light ready to fly weight and generous wing area. This combination makes for a very favorable wing loading, allowing the airplane to perform very well with the recommended Norvel engines. Since the Nitro Rascal ARF is factory built, you can only control the final ready to fly weight by choosing the most appropriate airborne radio equipment. In short, the performance of this model will be great with the right equipment but will be less so by choosing overweight or inappropriate radio equipment. This is a simple reality that has to be addressed. Fortunately, after-market receivers and servos, appropriate for this model, are not only readily available and are of good quality, they're now very reasonably priced.

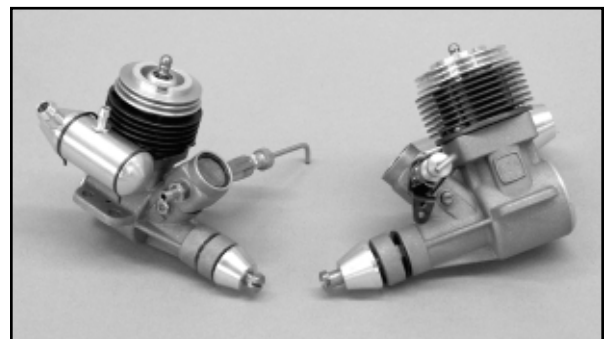
In flight-testing our Nitro Rascal models, we've used a wide variety of airborne radio equipment. For servos we have used and can highly recommend Hitec™ #HS-55 servos and the MAXX MX-50 servos. Similar servos are also available and can be used in the Nitro Rascal, provided they are of the same size, weight and power output. For receivers, we have used and can highly recommend the Hitec™ Electron 6 or the 555 Micro Receivers, as well as the FMA M5 Micro Receiver. Again, other receivers may be useable but make sure they are small enough and light enough. For best performance, always avoid excess weight. DO NOT use single conversion receivers for this aircraft. Such receivers are more prone to interference and should NOT be used.

To power the airborne radio system, we used either a 270 or 300 mAh Ni-Cad battery pack. Properly charged, this pack provides an honest 45 - 60 minutes of safe flying. These results can vary so be sure to cycle your battery pack to determine the safe amount of operating time for your particular system.



ENGINE SELECTION:

The Nitro Rascal ARF model was specifically designed around the Norvel® AME .061 R/C engine. This engine provides a lot of power



and is perfect for a model of this size. The motor mount can be easily enlarged a little to accommodate the Norvel® .074 BigMig R/C engine and this will be covered in this Assembly Manual. **NOTE:** Using engines any larger in displacement than the Norvel® .074 is totally unnecessary and is not recommended.

COVERING MATERIAL:

Your Nitro Rascal ARF has been professionally covered using Oracover®. This material is world famous for its ease of application, light weight, and consistency of color. If you live in a dry climate, you may notice that some wrinkles might develop after removing the covered parts from their plastic bags. This is perfectly normal in low humidity climates. The model was covered in a part of the world with relatively high humidity and therefore the balsawood was carrying a fair amount of moisture. When exposed to drier air, the wood typically loses this moisture, dimensionally "shrinking" in the process. This is what may cause some wrinkles. However, wrinkles are easy to correct by simply using a heat iron.

We suggest covering the shoe of the iron with thin cotton cloth, such as an old T-shirt, to prevent scratching. The iron should be set to about 280° - 300° F. Use the heated iron over the wrinkle to lightly shrink the material - do not press on it. Then lightly iron the covering back down to the wood. You can also use a hobby-type heat gun to re-shrink the covering but you must be very careful around seams or joints. Re-heating seams may cause them to "creep", making them unsightly. You must also be careful when using a heat iron or heat gun when working around the side windows and windshield - excess heat will distort these plastic parts.

An easy way to avoid over-heating seams, joints, and the windows when re-shrinking the covering is to protect them with wet paper towels. Soak the paper towels in cold tap water and roll them in strips for joints and seams. For windows and windshields, just shape the wet towel as needed. The coolness of the wet towels protects whatever is beneath them from heat.

For reference, your Nitro Rascal ARF was covered in Oracover® film with the following part numbers:

- #10 White and
- #21-29 Transparent Red or
- #21-59 Transparent Blue

REQUIRED TOOLS:

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

- A Selection of Glues - SIG Thin and Thick CA and SIG Kwik-Set 5-Minute Epoxy
- Threadlock Compound, Such as Loctite® Non-Permanent Blue
- Screwdriver Assortment
- Pliers - Needle Nose and Flat Nose
- Diagonal Wire Cutters
- Small Power Drill With Selection of Bits
- Pin Vise for Small Dia. Drill Bits
- Hobby Knife With Sharp #11 Blades
- Scissors
- Heat Iron and Trim Seal Tool
- Masking Tape
- Paper Towels



KIT CONTENTS: Perform a complete inventory before starting assembly.

Pre-Built Parts:

- 1 each Fuselage, Covered
- 1 each Fuselage Battery and Fuel Tank Access Hatch, Covered
- 1 each Fuselage Landing Gear Spreader, Covered
- 1 set Horizontal Stabilizer & Elevator Set, Covered (With 4 CA Hinges in Place, Unglued)
- 1 set Vertical Fin & Rudder Set, Covered (With 3 CA Hinges in Place, Unglued)
- 1 set Left & Right Wing Panels, Covered
- 1 each Wing Center Section, Covered
- 1 set Plastic Wheel Pants, 1 Left, 1 Right

Formed Wire Parts:

- 1 each Main Landing Gear Wire - .09 dia.
- 1 each Tail Wheel Assembly With Mounting Hardware
- 1 each Elevator Pushrod Wire - .040 x 24"
- 1 each Rudder Pushrod Wire - .040 x 24"
- 1 each Throttle Pushrod Wire - .040 x 14"

Hardware:

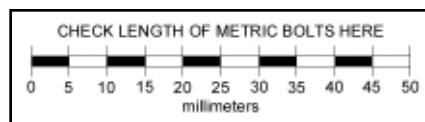
- 6 each #2 x 3/8" Battery Hatch (2) and Engine Mounting Sheet Metal Screws (4)
- 4 each #2 x 1/4" Wheel Pant Mounting Sheet Metal Screws
- 2 each Wheel Pant Mounting Brackets

Molded Parts:

- 1 each #4-40 x 1" Nylon Wing Mounting Bolt
- 1 each SIG 1-1/2" dia. Spinner Assembly With Metal Shaft Adaptors (2) For Norvel® .061 and .074 Engines
- 1 each 60cc (2.02 oz.) Fuel Tank Assembly With All Required Hardware
- 1 set Clear Plastic Side Windows - 1 Left, 1 Right
- 1 set Mini Nylon Rudder & Elevator Control Horns
- 3 each Nylon Pushrod Retainers
- 2 each Nylon Wheel Axle Caps

Miscellaneous:

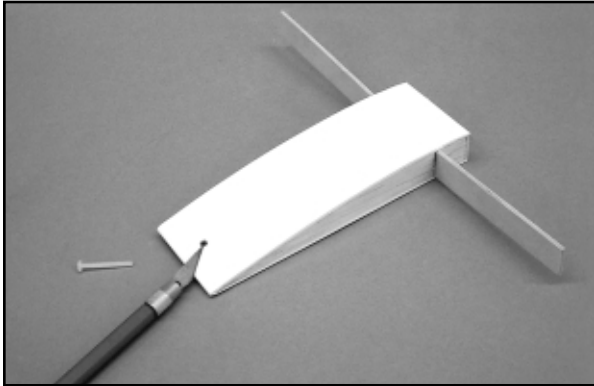
- 1 each 3/16" x 3/8" x 2" Balsawood Fuel Tank Retainer
- 4 each White Self-Adhesive Strips - 1/4" x 10" - Wing Joint Covering
- 2 each Main Wheels - 1-3/4" dia.
- 1 each Instrument Panel, Printed
- 1 each Wheel Fairing Cardstock - 2-1/2" x 4-1/4"
- 1 each Nitro Rascal Decal Set
- 1 each Nitro Rascal Assembly Manual



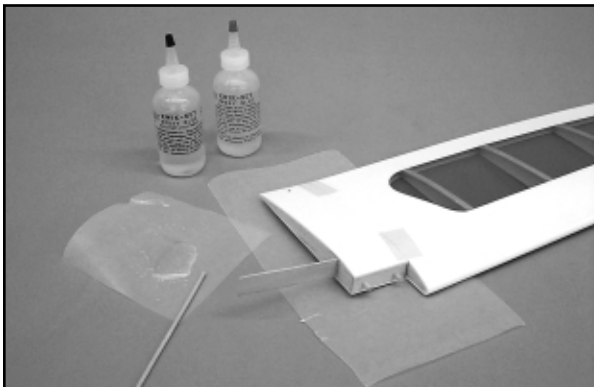
ASSEMBLY:

WINGS:

□ 1) Start by using a hobby knife with a #11 blade to clear out the rear wing bolt holes on the top and bottom of the wing center section. Test fit the wing center section to the fuselage and secure with the provided nylon 4-40 wing bolt. The fit will be good, with the center section well centered on the fuselage.



□ 2) Remove the center section from the fuselage and test fit the wing panels onto the exposed plywood dihedral brace ends. The fit should be firm. Use 5-minute epoxy to join one of the wing panels to the wing center section. Apply glue to the correct side of the exposed rib on the center section and also apply a thin coat onto the plywood brace. Slide the center section plywood brace into the slot in the appropriate wing panel. Press the wing panel firmly in place to the center section. Wipe off all excess glue with acetone or alcohol and tape the panel securely to the center section - top and bottom. Allow the epoxy to set and glue the remaining wing panel in place.



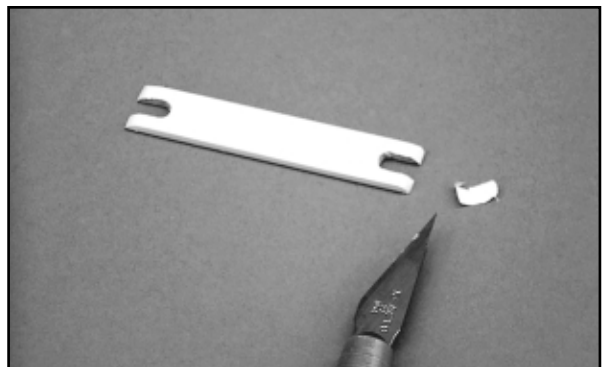
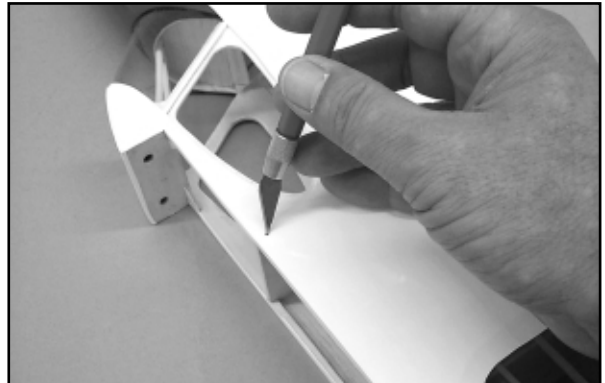
□ 3) After the glue has set, use the four provided 1/4" x 10" self-adhesive strips of white Oracover® film to cover the bottom and top wing joints, centering the covering over each joint. Save the



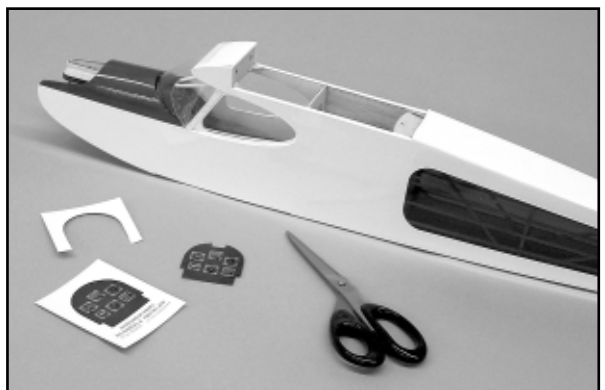
excess strip material. Check the fit of the completed wing to the fuselage. Remove the wing and set it aside for now.

FUSELAGE:

□ 1) Using a hobby knife and a sharp #11 blade, clear-out and open up the various required holes in the fuselage covering; the rear rudder and elevator control cable exits, the antenna exit hole on the right fuselage side at the top just behind the window location and the on/off switch slot on the left fuselage side, beneath the side window. Also cut the covering away from the slots on each side of covered plywood landing gear spreader.



□ 2) From the kit contents, locate the printed instrument panel. Use scissors to cut out the instrument panel including a recess at the top, allowing clearance for the forward cockpit supports. Test fit the instrument panel in place. Trim as needed for a good fit. Glue panel to front fuselage cabin former using a little white glue.

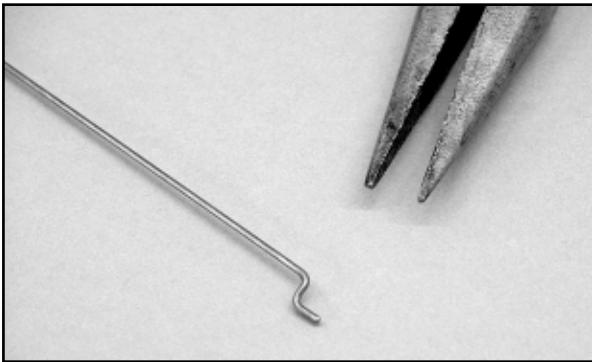


□ 3) The rudder and elevator servos are now installed into fuselage. Note that the pre-installed rudder and elevator pushrod tubes cross each other as the progress to the rear of the fuselage. Therefore, viewing the fuselage from the rear, the rudder servo is installed on the right side of the servo tray and the elevator servo is installed next to it, on the left side. Both servo output arms face

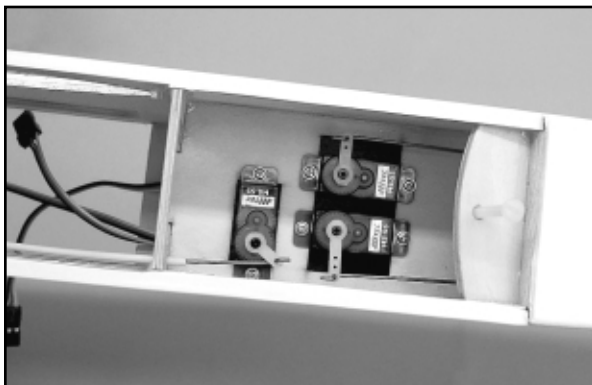
toward the fuselage sides at 90° to the servo body. The throttle servo is installed with its output arm aligned with the throttle pushrod tube.



□ 4) From the kit contents, locate the two .040 x 24" wire pushrods for the rudder and elevator and one .040" x 14" pushrod for the throttle. Using a pair of needle nose pliers, bend a simple "Z"-bend into one end of each of the three pushrods. Insert the straight, unbent end of one of the 24" pushrods into one of the plastic pushrod tubes - just behind the servo tray - and feed it through to the exit at the rear of the fuselage. This is easiest to do by running the wire through one of the side window openings. Install the remaining 24" pushrod in the same manner.

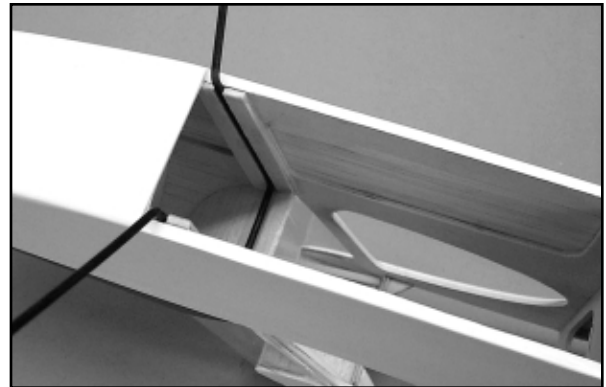


Feed the 14" throttle pushrod wire through the top rear wing opening and into its plastic tube. Take care not to permanently bend or kink the pushrod during this process. Remove the servo output retaining screws in all three servos. Remove the output arms and attach the "Z" bend end of each pushrod to its corresponding output arm. Temporarily press each output arm back in place onto the servos. Plug your servos into the appropriate receptacles in the receiver and plug the battery pack into the system. Turn the transmitter on, making sure the trim levers are in neutral. Now reposition the rudder and elevator output arms back onto their respective servos, as close to 90° as



possible to the servo body. The throttle output arm must move back and forth to operate the engine's throttle lever, so set it at about 20° to obtain roughly equal fore and aft movement. With the output arms correctly in place, re-install the output arm retaining screws and turn the radio system off.

□ 5) The main landing gear is now glued in place in the fuselage using 5-minute epoxy. First check the fit by sliding the landing gear in place into the two slots at the bottom, front of the fuselage. Carefully slide the gear all the way up into place inside the fuselage to get a feel for the fit. Remove the gear from the fuselage and use sandpaper to sand the wire, where it contacts the fuselage sides. 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 alcohol and allow the glue to set.



□ 6) Fit the covered plywood landing gear spreader in place over the wire landing gear legs and onto the bottom of the fuselage. Trim as needed for a good fit. Remove the spreader and apply 5-minute epoxy to its bottom outside edges, where it contacts the fuselage bottom. Also apply a little glue along the front edge of the spreader where it butts against the bottom forward fuselage sheeting. Press the spreader in place, wipe off any excess glue with alcohol. Tape firmly and allow the glue to set.



□ 7) The 2-ounce (60cc) fuel tank supplied with this kit is now assembled. We suggest using a simple two-line system in this airplane. One fuel line is connected to the "clunk" or fuel pick-up line and the engine's carburetor. The second line is the overflow line for use when filling the tank. This same line is then connected to the muffler pressure nipple, providing muffler pressure to the fuel tank. Note that the "sides" of the fuel tank are the flat sides.

The rubber stopper for the tank has two holes all the way through it. Use these two holes for the two aluminum fuel lines. Slip two aluminum tubes through the rubber stopper. Slide the smaller

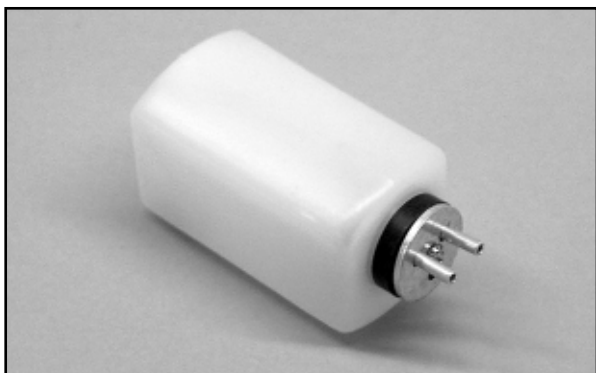
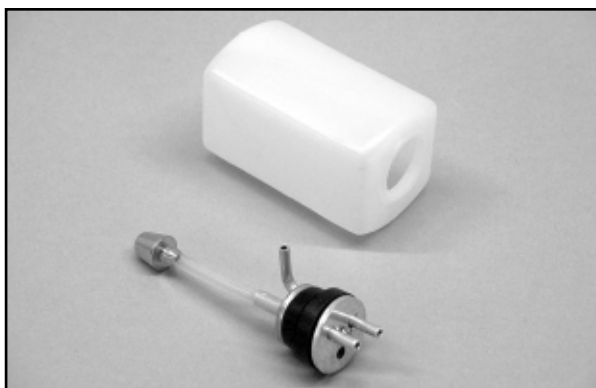
diameter rear clamp plate over the two tubes and up against the rear face of the rubber stopper. Slide the larger diameter front plate over the two aluminum tubes at the front of the stopper and up against the stopper itself. Press the clamp bolt through the front plate and the rubber stopper, back to the rear plate. Use a screwdriver to start the bolt threads into the rear plate - do not tighten yet. At the front, leave approximately 1/4" of each tube exposed in front of the plate. Gently bend the aluminum overflow tube upwards to about 80° to reach the top of the tank body - always leave about 1/32" space between the overflow tube and the inside of the tank body. Trim the two tubes to appropriate length and remove any burrs with sandpaper. Install the fuel pick-up weight onto one end of the silicon tubing. Measure and cut the tubing length to allow the fuel pick-up weight to just about reach the rear of the fuel tank, allowing its free movement within the tank-body when the rubber stopper is fully in place in the front of the tank. With everything now adjusted and fitting nicely, insert the tank stopper assembly fully into the front of the tank body and use a screwdriver to firmly tighten the clamp bolt while holding the stopper assembly firmly in proper orientation. The bolt compresses the rubber stopper between the plates, forming a good tank seal.

fuselage side.

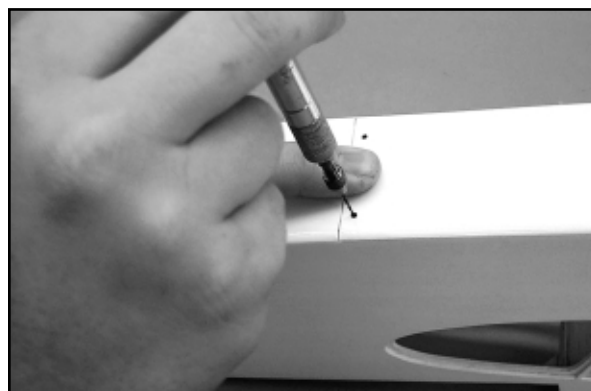


□ 9) Locate the pre-covered Tank/Battery Hatch from the kit contents. This hatch has a plywood "lip" at one end and two pre-drilled holes at the other end. The end with the lip is the front. The hatch fits into the bottom of the fuselage and is removable for ready access to the fuel tank and the battery compartment beneath the tank. Install the front hatch lip into the fuselage, beneath the landing gear spreader, pressing it firmly in place to the fuselage.

Hold the hatch in place and use your pin vise and a .046" dia. drill bit (#56 numbered drill) to drill two holes through the hatch retention block, directly beneath the two pre-drilled holes. The hatch can now be secured to the fuselage using the two #2 x 3/8" sheet metal screws provided - do not over-tighten these screws, just snug them in place to create the threads. Remove the screws and the hatch from the fuselage. Apply a drop of thin CA glue into each screw hole. Allow the glue to set and re-thread the screws into each hole to establish the threads. Set the hatch and mounting screws aside for now.



□ 8) The assembled fuel tank is now installed into the fuselage. First, trial-fit the tank in place to check for the fit. Insert the tank into the nose of the fuselage through the bottom Tank Hatch opening and guide the front of the tank to the pre-cut round opening in the firewall. The tank stopper should fit through this hole and the tank body should fit up against the rear face of the firewall. Remove the fuel tank from the fuselage. Apply a generous bead of clear silicon adhesive (bathroom type is fine) around the tank stopper at the front of the tank. Re-install the tank into the fuselage - make sure it is right side up - and press it firmly in place against the firewall. From the kit contents, locate the 3/16" x 3/8" x 2" balsawood Fuel Tank Retainer. This retainer is inserted into the fuselage, between the fuselage sides, at the rear of the fuel tank to hold it firmly in place to the firewall. If needed, lightly sand its ends to achieve a firm fit. Hold the retainer in place and use a drop of two of thin CA glue to hold it in place to each



ENGINE INSTALLATION:

PROP TALK:

Before installing the engine, it is important to give some thought to suitable propellers for your airplane/engine combination. We have used a variety of propellers for our Nitro Rascal ARF models and have learned that different brands seem to all have different prop shaft hole diameters. Usable prop sizes for the Norvel® .061 are 6" to 7" in diameter. APC produces great props in these sizes but they are produced with large diameter shaft holes. The Norvel .061 engine has a prop shaft size of .124. APC props in the 6" to 7" diameter have much larger mounting holes. To mount an APC prop, we found that the easiest way to center it to the Norvel prop shaft was to "sleeve" its mounting hole with two short lengths of telescoping K&S aluminum tubing. The inner piece of tubing has a 1/8" dia. I.D. which fits perfectly.

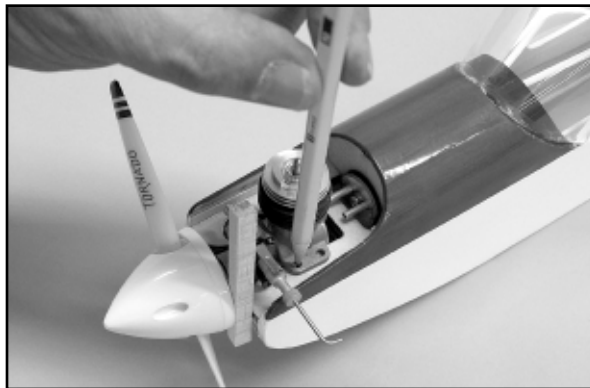
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In the case of other propeller brands, some, such as Master Airscrew's 6" diameter props, require drilling out their smaller diameter mounting holes with a 1/8" dia. drill bit. This is always best done with a drill press. Finally, any propeller used on a model airplane engine should always be carefully balanced to run true and eliminate undue vibration.

In addition to adapting a propeller to the engine, you must also find a small metal washer that has a 1/8" I.D. to fit the Norvel® .061 prop shaft. This is because the Norvel® prop shaft bolt is not long enough to engage the engine threads with the spinner and prop in place, using the standard Norvel® spinner/washer. We found that a Du-Bro Flat #4 washer worked perfectly.

We suggest that you prepare your propeller for mounting to the engine before beginning the installation of the engine. For reference, a good starting prop size for the Norvel® .061 R/C engine would be a 6 x 3. Later, you can experiment with different pitch numbers and perhaps even try a larger 7 x 3 prop.

□ 2) Place the engine onto the fuselage engine mount plate. The correct distance from the back face of the spinner to the very front of the fuselage is 1/4". Use a scrap piece of 1/4" balsa as a spacer on the left fuselage side and adjust the position of the

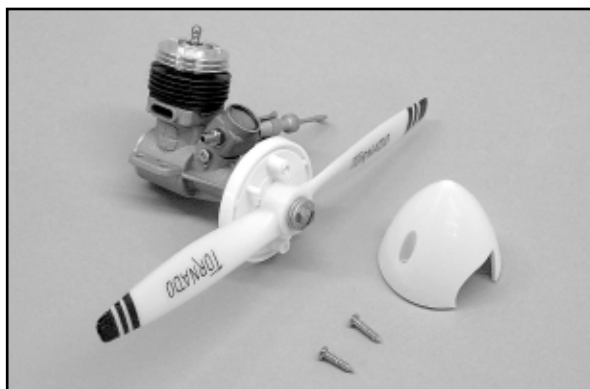


engine as shown. Use a soft lead pencil to carefully mark the four engine mounting holes onto the plywood engine mounting plate. Remove the engine.

Use a 1/16" dia. drill bit to drill four "pilot" holes squarely through the marks in the motor mount.

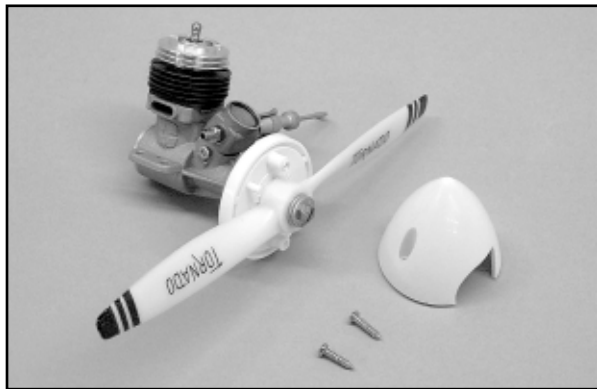


Mount the engine to the plywood motor mount using the #2 x 3/8" screws provided. Remove the screws and engine from the motor mount. To protect these four holes from fuel damage, apply a couple of drops of thin CA glue into each hole and allow the glue to set. Now run each screw back into each hole to re-establish the threads. Before final-mounting the engine, cut two 3" lengths of small dia. silicon fuel tubing and slide one piece onto each of the two aluminum fuel tank lines. Re-install the engine to the motor mount. Trim and connect the two silicon fuel lines to the carburetor and muffler pressure tap nipple.

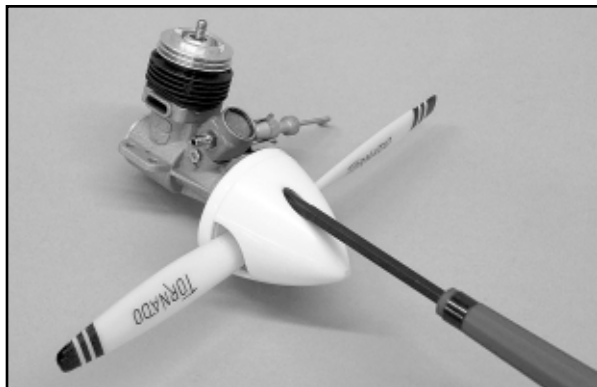


□ 1) Note that the down and right thrust angles have already been built into the plywood motor mount. Also note that this instruction assumes you are mounting the Norvel® .061 R/C engine. Begin by removing the engine muffler from the engine, setting it aside for now.

From the kit contents, locate the Spinner Assembly bag. You will also need your prepared and ready to mount propeller. From the spinner assembly bag, locate the aluminum adapter that has the smaller hole in its center - this adapter is for the Norvel® .061 engine. Start by sliding the prop shaft washer onto the prop shaft bolt, followed by the propeller, then the spinner backplate, and finally, the aluminum spinner adapter ring that fits into the recess in the back of the spinner backplate.



This assembly is now bolted onto the front of the engine. The plastic spinner cone is fitted to the spinner backplate, aligning its tabs into the backplate recesses. Mount the spinner cone to the backplate using the two provided sheet metal screws.



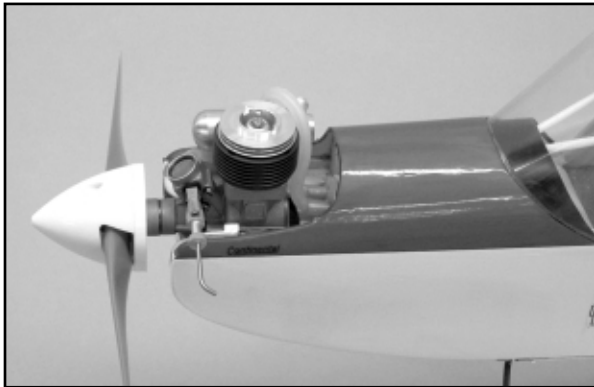
OPTIONAL - MOUNTING THE NORVEL .074 R/C ENGINE:

To mount this engine in your Nitro Rascal ARF, there are two considerations to address first;

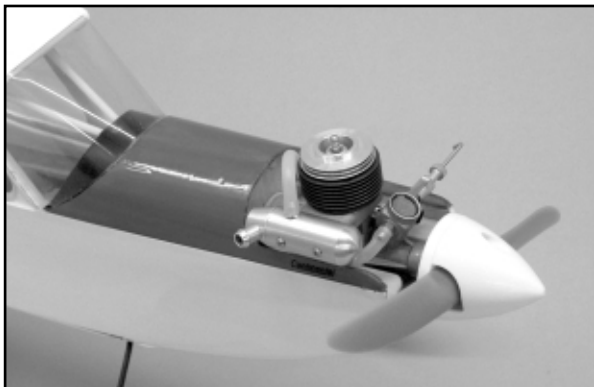
- a) Widening the motor mount plate to accept the wider .074 crankcase body.
- b) The need to create just a little more clearance for the larger .074 muffler body.

The following instructions address these two requirements:

a) To accept the .074 crankcase body, each side of the motor mount opening must be trimmed .040 (just under 3/64") - no more. To do this, first use a small straight edge and sharp pencil to draw a parallel line, 1/32" from the inside edge of each side of the motor mount opening. Use a sanding block or a Dremel® Tool with a sanding drum bit, to remove the excess material to the line just drawn. Next use a sanding block to remove the plywood equally from each side of the mount until the engine slips into place easily. Use clear or colored dope to protect the exposed wood on the trimmed motor mount plate.



b) The Norvel .074 muffler body is somewhat larger than the .061 muffler. Without some trimming, it will come in contact with the right fuselage side when in place. The balsawood sheeting on the right fuselage side, at the nose, must be cleared to allow no contact when the engine/muffler is in place. Simply use a hobby knife and a sharp #11 blade to carefully cut away enough of the right side nose sheeting to let the muffler clear without contact. The exposed wood can then be clear doped or re-covered with a scrap of covering material to protect it from fuel.



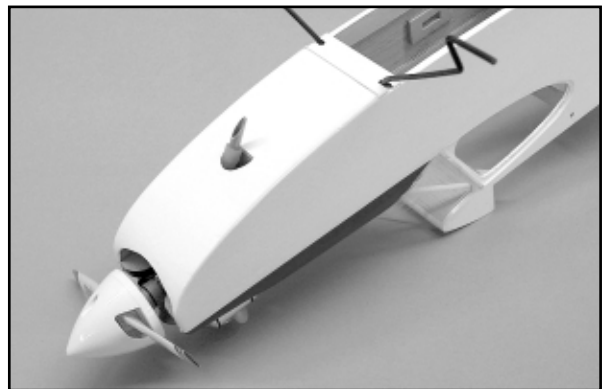
The engine can be mounted using the instructions provided in Steps #1 and 2 above.

BUILDER'S TIP:

Small engines, running at high rpm's, can create a lot of exhaust and carb spray that ultimately winds up on your model. Because

the Norvel® .061 muffler has an exhaust exit that can be positioned 360°, we found a lightweight and neat way to make a simple exhaust extension.

To make this exhaust extension system, you will need a 5" length of large 1/8" I.D. silicon tubing and a short length (1" or so) of 3/16" O.D. K&S aluminum tubing. Use a sanding block or a power-sanding disk to chamfer one end of the aluminum tubing to a 45° angle. Clean up any burrs with a hobby knife and sandpaper. Insert the unchamfered end of the aluminum tubing into one end of the silicon tubing, about halfway. Insert the other end of the silicon tubing into the bottom of the fuselage, through the pre-cut drain hole on the bottom. Guide the tubing up through the space just behind the engine itself in the motor mount plate. Continue pulling the tubing until the end with the aluminum tubing encounters the drain hole. Now gently insert the aluminum tubing end about halfway into the drain hole, with the 45° chamfer facing directly back toward the rear of the fuselage.



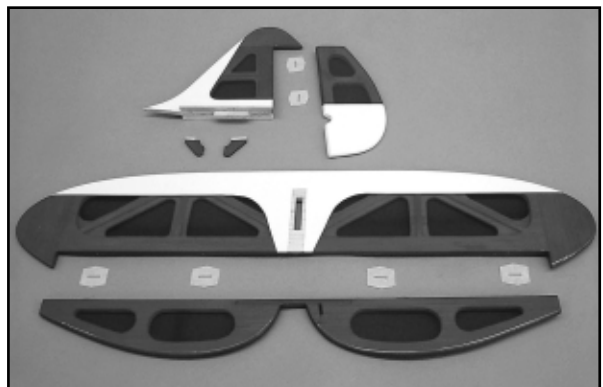
At the top, trim the length of the silicon tubing to allow its end to be pressed in place over the muffler nipple.

This simple exhaust extension does several things. It provides a bit more back-pressure to the engine and improves the idle without sacrificing a noticeable amount of power. Of course, the number one benefit is that most of the exhaust residue is directed down and out of the fuselage. Give it a try!

The only remaining engine installation task is to connect the throttle pushrod to the throttle servo - this will be done in the RADIO INSTALLATION section.

MOUNTING THE TAIL GROUP:

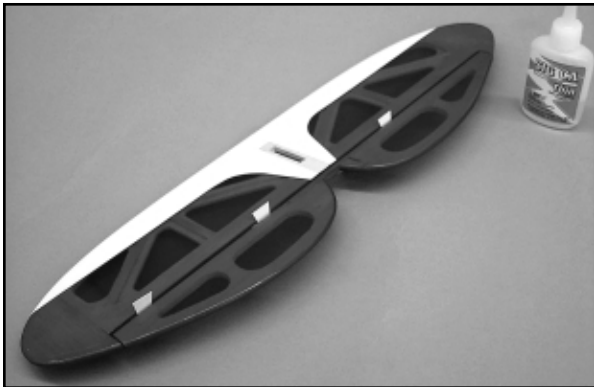
- 1) From the kit contents, locate the bags containing the horizontal stabilizer and elevators and the vertical fin and rudder.



Also locate the two plywood control horns. Note that the elevators and rudder are only temporarily attached to the stabilizer and fin with unglued CA hinges in their pre-cut slots. Remove the elevators from the stabilizer and the rudder from the fin. Remove the CA hinges from the slots.

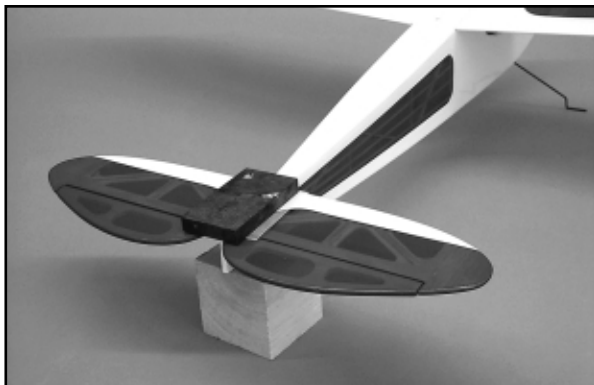
□ 2) The elevators can now be hinged in place to the horizontal stabilizer. Carefully note that the two pre-drilled holes for the elevator control horn are on the **right** elevator half. The supplied hinges are the CA type. Use only instant or "thin" CA glue to install these hinges!

Begin by inserting the four CA hinges into the four slots in the trailing edge of the stabilizer, aligning their center slots along the trailing edge. Using four thin pieces of wood or cardboard (business card thickness is about right), insert these into the slots in the hinge. Now mount the elevators to the exposed hinge halves, pushing the elevators up to the scrap wood or cardboard hinge inserts. Remove one of the hinge insert scraps, flex the elevators downward, exposing the center of the hinge. Apply 3 or 4 drops of thin CA glue to the hinge, at the centerline. Turn the stabilizer over and repeat this process on the same hinge. Repeat the same procedure for the remaining three elevator hinges. Any excess glue can be easily removed with a little SIG CA Debonder and a paper towel. Because it takes a little time for the CA to fully "wick" its way all through the hinge and into the surrounding wood, leave the stabilizer/elevator assembly alone for at least 10 minutes before moving the elevators. Flex the elevators firmly up and down to make them supple and easy to move.

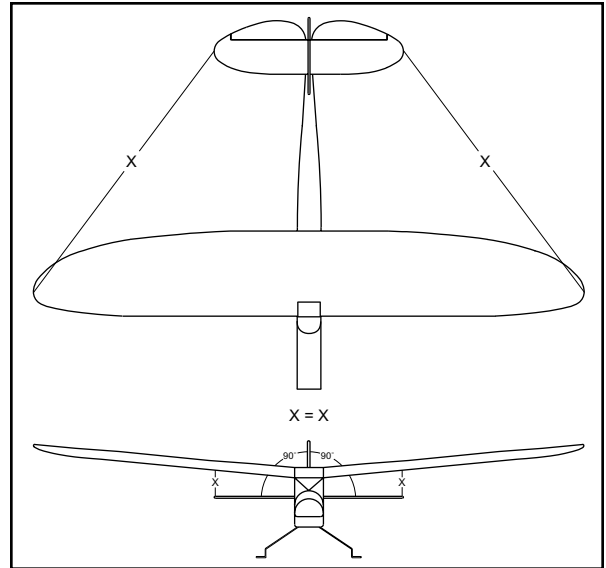


□ 3) With the elevators in place, the horizontal stabilizer is now glued in place to the top rear of the fuselage. Use SIG 5-minute epoxy for this operation.

Begin by mounting the wing to the fuselage. Place the model on a flat surface, allowing you to view it directly from the front. Prop up the rear of the fuselage with a scrap piece of wood approximately 3". Apply epoxy glue to the fuselage stabilizer saddle area and

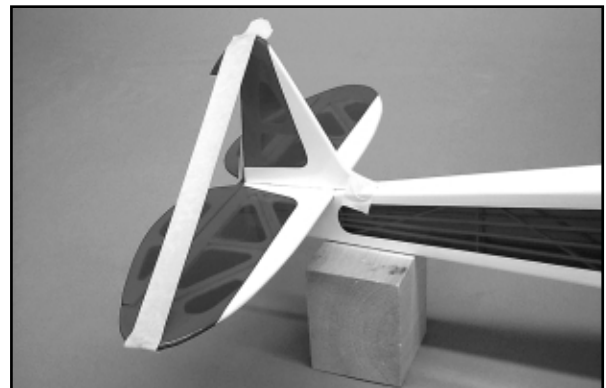


carefully place the stabilizer onto the saddle, centered as closely as possible. Use pins or small weights to hold the stabilizer firmly to the fuselage. Carefully view the airplane from the front to see if the stab is squarely in place in relationship to the wing/fuselage, without tilting to one side or the other. Make any adjustments needed to position and hold the stabilizer in this position. Allow the glue to set completely.



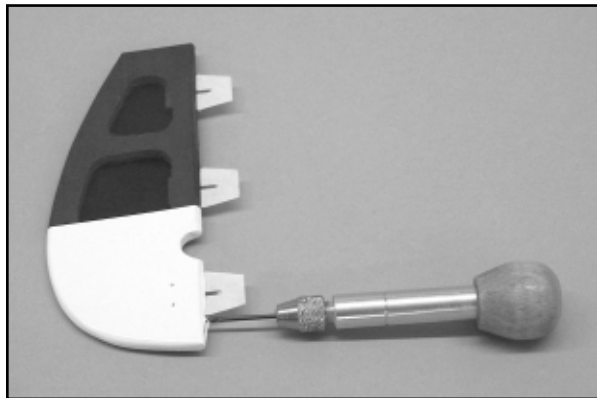
□ 4) The vertical fin, without the rudder hinged in place, is now glued in place to the top of the stabilizer, again using SIG 5-minute epoxy.

Begin by first test fitting the vertical fin in place into the slot in the top of the stabilizer, without using any glue. Trim if needed to achieve full contact with the stabilizer and top rear of the fuselage. Once again mount the wing to the fuselage and prop up the rear of the fuselage about 3" with the airplane on a flat surface. Apply glue to the bottom of the fin and the sides of its locating tab. Carefully press the fin in place onto the stabilizer and fuselage. Wipe off any excess glue, using alcohol and a cloth. Again view the airplane from the front, making sure the fin is in place at 90° to the stab. Use tape as needed to hold the fin in this position and allow the glue to set. After the glue sets, remove the tape and the wing.

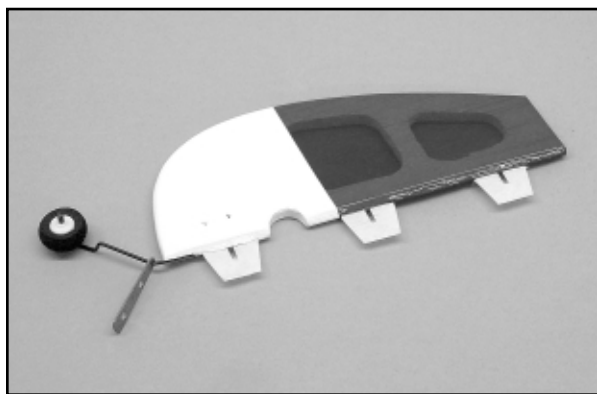


□ 5) Before hinging the rudder to the vertical fin it must be prepared by inserting and gluing the tailwheel wire - with its metal mounting bracket loosely in place - to the bottom leading edge of the rudder. Measure 1/2" up from the bottom leading edge of the rudder and place a small mark with a soft lead pencil. Use a 1/16" drill bit to drill a hole at the previous marked location through the

center of leading edge of the rudder to a depth of 1/2". Use a hobby knife and a sharp #11 blade to cut a "V" notch in the leading edge of the rudder from the hole to the bottom of the rudder. Trial fit the tailwheel wire into the leading edge of the rudder to make sure that the wire is flush with the leading edge of the rudder. When satisfied with the fit of the tailwheel wire remove it. Mix a small amount of 5-minute epoxy and carefully fill the hole and the "V" notch with glue. Push the tailwheel wire into position in the rudder and wipe off any excess glue that squeezes out. Allow the glue to cure.

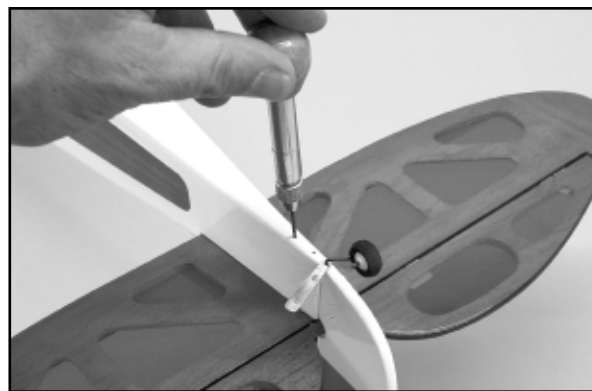


The rudder is now ready for hinging to the vertical fin and fuselage with the three CA hinges.



The hinge slots for upper two CA hinges that fit into the vertical fin are ready to use. The bottom hinge slot in the rear of the fuselage has also been pre-cut at the factory, but is covered. It is necessary to open this slot up to allow placement of the bottom rudder hinge. To do this, use a sharp #11 blade to find and open the slot. Reinstall the rudder and hinges and adjust the hinge gap between the fin and rudder to 1/32". Use a piece of tape to hold the rudder hard over to one side. On the opposite side, the hinges should be visible. Apply 4 small drops of thin CA glue to each of the three hinges at their exposed centers. Untape the rudder and flex it hard over to the opposite side and again tape it in place. Apply another 4 drops of glue to the opposite sides of each hinge. Untape the rudder and position it in neutral. Allow about 10 minutes for the glue to fully "wick" through the hinges. When the CA glue is fully set, flex the rudder back and forth firmly several times to loosen and free-up the movement.

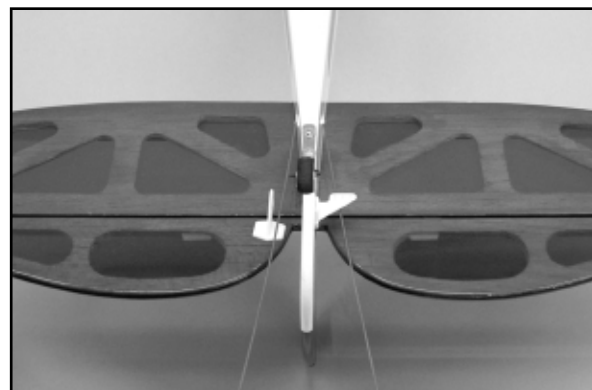
□ 6) The metal tail wheel bracket/support is now mounted to the bottom rear of the fuselage, using the supplied #2 x 1/4" screws. With the fuselage upside down, place the metal support bracket in front of the tailwheel wire, centered onto the fuselage bottom. Mark the position of the two mounting holes onto the fuselage with a soft pencil. Swing the bracket out of the way and use a 1/32" dia. drill bit to make two pilot holes at the marks just made.



Mount the bracket firmly in place using the two #2 x 1/4" screws.



□ 7) From the kit contents, locate the two white plastic control horns. These are now mounted to the rudder and elevators. Note that the rudder and elevators have two pre-drilled holes for this purpose. Viewing the airplane from the rear, the rudder horn is mounted on the left side of the rudder. The elevator control horn is mounted to the bottom right elevator half. To mount the horns, apply a small amount of thick CA glue to each "spike" and a dab of thick CA glue to the bottom base of the horn, between the spikes. Firmly press the control horn in place, making sure the holes are facing forward toward the front of the fuselage. Allow the glue to set.



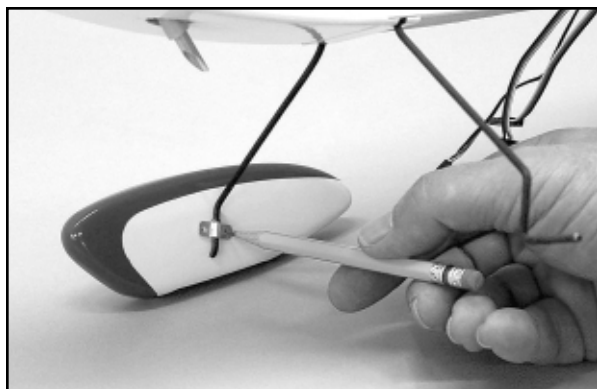
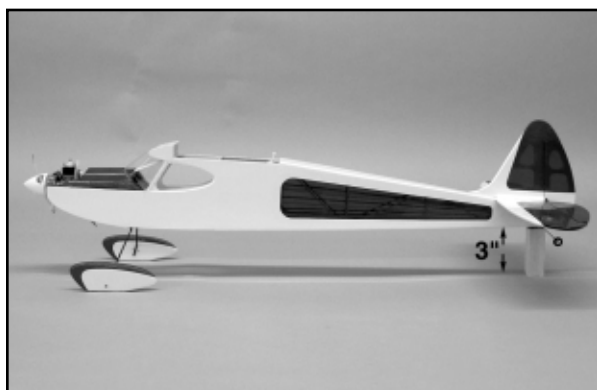
WHEEL PANTS:

□ 1) Position the wheel pants in place onto the wire landing gear axles. Note that the inner facing sides of the wheel pants - the side facing the fuselage - can be identified by looking inside and observing the plywood mounting pads. Correctly in place, these pads should be located against the upright wire landing gear wire. From your parts bag, locate the two metal landing gear clips and

the four #2 x 1/4" mounting screws.



□ 2) The wheel pants must first be correctly aligned to the landing gear wire and 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. This provides the correct side view alignment for mounting the wheel pants.

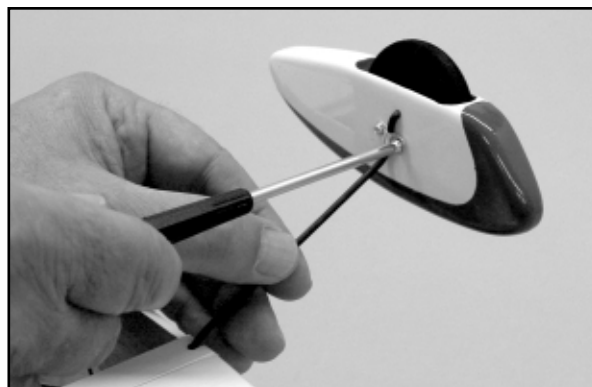


□ 3) Press one of the metal landing gear clips onto the upright wire leg of the landing gear, immediately next to the wheel pant. Slide the clip up or down on the wire until the bolt holes are approximately 3/8" above the axle hole. Use a sharp pencil to mark the clip's two bolt hole centers onto the wheel pant. After



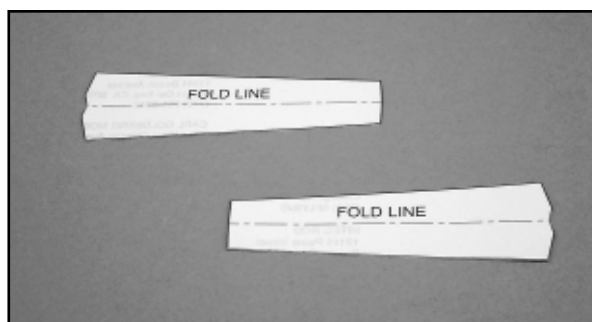
making these marks, remove the wheel pants from their axles. Use a pin vise and a .046" dia. drill bit (#56 numbered drill) to drill guide holes through the wheel pants and the inside plywood mounting pads, at the marks just made.

□ 4) Slip a wheel pant onto its appropriate axle and then insert one of the wheels into the pant and onto the axle. Continue pushing the axle through the wheel hub and through the outer wheel pant hole. Mount the pant and wheel to the landing gear using the #2 screws through the clip and into the pre-drilled holes on the side of the pant. Do not over-tighten the screws, just snug them in place. Repeat this process for the remaining pant and wheel. Test the wheel pant/wheel relationship, making sure that the wheels roll freely with little or no friction. Adjust as needed to achieve free movement.



OPTIONAL LANDING GEAR FAIRINGS:

Included with your kit is a card sheet measuring 2-1/2" x 4-1/4". This is the material used to make the optional landing gear fairings. Use the patterns provided in this manual. First remove the wheel pants. Cut-out two landing gear fairings from the card stock and bend them sharply in two at their leading edges. Mix a small amount of 5-minute epoxy and spread it on the inside surface of the fairing. Place the fairing onto the wire landing gear leg and clamp or tape the trailing edge together. Align the fairing accurately with the fuselage and allow the glue to cure.



Use light sandpaper (#400 or similar grit) to lightly sand the trailing edges smooth and sharp. These fairings can now be finished with Oracover® film or primed and painted. Remount the wheel pants.

RADIO INSTALLATION:

With the servos already mounted, all that remains is to install the radio system On/Off switch, the battery pack, the receiver and to connect the rudder, elevator and throttle pushrods. Your airborne battery pack should be charged and ready to use for these steps and you should also have some pieces of lightweight foam for wrapping and packing the battery and receiver within the fuselage.

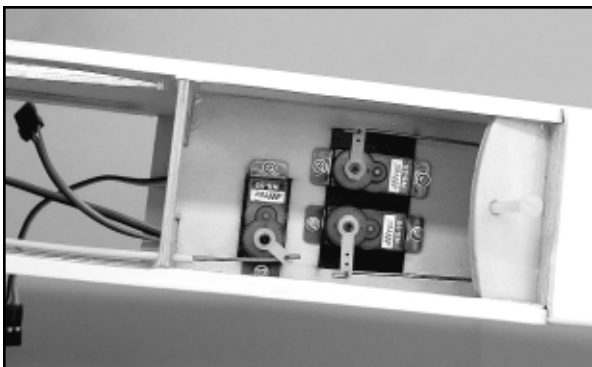
□ 1) The radio system On/Off switch is mounted on the left fuselage side, beneath the side window. You will see a plywood rectangle glued to the inside of the left fuselage side - this is the switch mounting plate. In order to mount your switch you will need to open the covering over the inner rectangular cutout to accept the switch lever. Use a hobby knife and a sharp #11 blade to do this neatly. The On/Off switch can now be mounted to the fuselage using the mounting hardware that came with your radio system. In our Nitro Rascal ARF models, we chose to use a Hitec™ aftermarket "Micro" Switch Harness - P/N #54403, in the interest of its lighter weight and much smaller size.

□ 2) Wrap the battery pack in light foam. Plug its connector into the switch connector and install the pack into the nose of the fuselage, directly beneath the fuel tank. The pack can be easily held firmly in place with another piece of foam.

□ 3) Plug the servo connectors into the appropriate receiver receptacles (for most Mode II pilots, the rudder servo is plugged into the aileron receptacle) and plug the switch connector into the receiver's battery receptacle. Turn your transmitter on and test the system to make sure the servos are moving in the correct directions. Turn the radio system off. At this point, we re-installed the bottom fuselage hatch. We then installed our foam wrapped receiver directly onto the floor of the fuselage, in the cockpit area. We first cut and fit a piece of light foam to fit on the fuselage floor. We then placed the receiver onto this foam sheet, followed by another thin foam sheet over the receiver.

The receiver antenna is routed out of the fuselage, through the pre-drilled hole on the upper right fuselage side, above the side window. The end of the antenna can then be attached to the top of the vertical fin with a rubber band and a pin or, as we did, it can be routed along the fuselage side and held in place beneath the horizontal stabilizer, again with a rubber band and pin.

□ 4) The carburetor arrangement on the Norvel® .061 R/C engine has the throttle lever moving to the rear for full throttle and forward for low throttle. Turn your transmitter on and set the throttle stick in the full "low throttle" position. Set the transmitter throttle trim in the



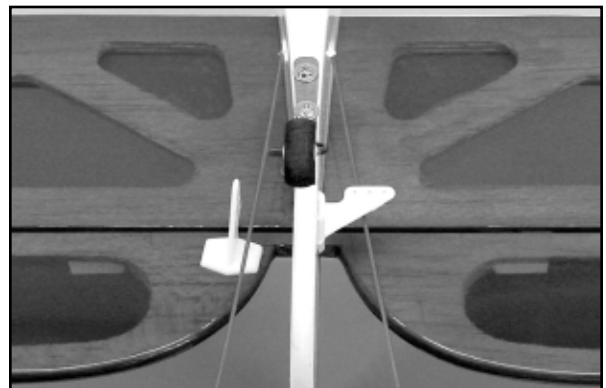
neutral position to allow equal amounts of trim in either direction. Now turn on the airborne radio system. The servo output arm on the throttle servo should be in the low throttle position - arm forward at about 20°. When the transmitter throttle stick is moved up toward the full throttle position, the servo output arm should likewise move toward the rear of the fuselage and in the full throttle position, it should be about 20° toward the rear. If necessary, reposition the servo output arm on the servo until it moves in this approximate manner. The linkage from the servo to the engine throttle lever is now made.

Move the throttle servo to the full "low" position using the transmitter. Use a fine tip felt marker to mark the location of the engine's throttle lever hole - the lower of the two - onto the throttle pushrod wire. Slide a plastic pushrod retainer onto the throttle pushrod, moving it all the way back to the pushrod tube. Use needle nose pliers to make a 90° bend in the pushrod wire at the mark just made. Trim the end of the bent wire to within about 1/8". Slide the pushrod retainer forward and flex its arm outward to engage the end of the wire. Press the wire through the retainers arm.

Test the action of the throttle using the transmitter. It should be free and without binding. If your transmitter has EPA (End Point Adjustments), use this feature to optimize the travel of the servo, matching it to the movement of the throttle lever.

□ 5) The rudder and elevator pushrods are now connected to the control horns at the rear of the fuselage. Again, turn on the transmitter and place the rudder and elevator trim levers in neutral. Turn on the airborne radio system. As previously described, the output arms should be in position to the servo body at 90°. If necessary, remove the output arms and reposition them back onto the servo in this position.

Use a small piece of tape to hold the rudder in the neutral position to the vertical fin. Turn the fuselage upside down. Hold the metal pushrod wire up against rudder control horn, at the middle hole.

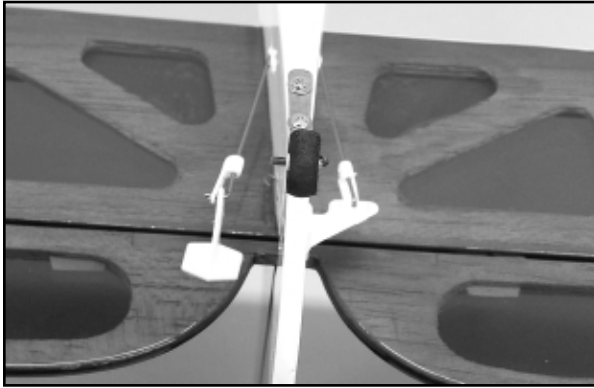


Use a fine tip felt marker to mark the wire exactly where this hole is. Slide a plastic pushrod retainer onto the pushrod wire, moving it all the way forward to the fuselage. Use needle nose pliers to now bend the rudder pushrod wire to a 90° angle at the mark just made. Trim the bent wire end to within 1/8" and press the bent end through the middle hole in the control horn. Slide the retainer forward and flex its arm to fit over the bent end of the wire. Remove the piece of tape holding the rudder in neutral.

Test the rudder movement with the transmitter. It should move smoothly without any binding and right transmitter stick movement should produce right rudder movement. Check this twice and then check it again! If needed, use the rudder (aileron) trim lever to set the rudder in true neutral to the vertical fin.

The elevator pushrod is connected to the elevator control horn in the same manner as the rudder. We suggest using the outermost hole in the control horn for the attachment point. Again, use small pieces of tape to hold the elevators in the neutral position to the horizontal stabilizer.

Test the movement of the elevators using the transmitter to make sure everything is moving in the correct direction. If needed, use the elevator trim lever on the transmitter to set the elevators in true neutral.



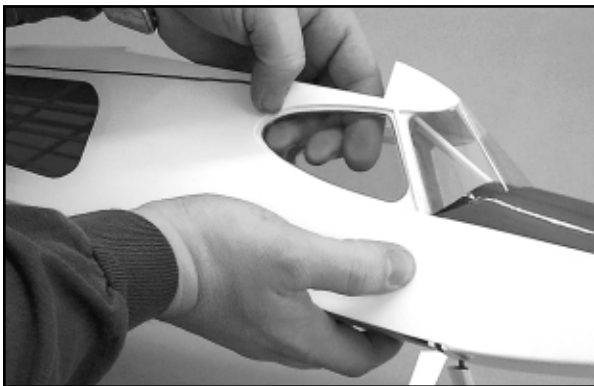
RECOMMENDED INITIAL CONTROL MOVEMENTS:

RUDDER: 3/8" RIGHT - 3/8" LEFT
 ELEVATORS: 1/4" UP - 1/4" DOWN

(Note that these control movements can be changed later to suit your particular flying style and preferences)

SIDE WINDOW APPLICATION:

From the contents of your kit, locate the small bag containing the molded side windows. 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! Use scissors to cut out each window, leaving about 1/8" of plastic around the edges for a gluing surface. 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. A little alcohol will clean off any excess glue from the windows.

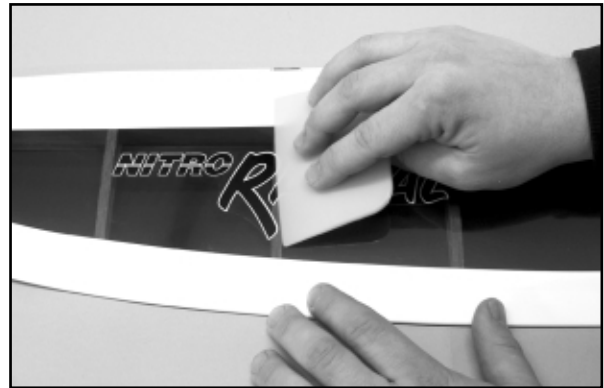


DECAL APPLICATION:

The decals supplied with your Nitro Rascal ARF kit are high quality Mylar with an extremely aggressive adhesive. These are not die-cut and must be cut from the sheet with hobby knife and sharp #11 blade or with sharp scissors.

We suggest the following method to accurately apply these decals.

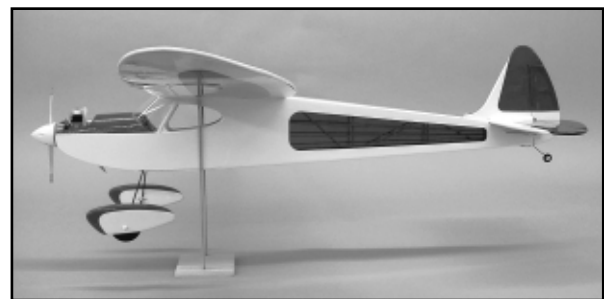
Carefully cut out the decal with a hobby knife. Lift it carefully off its sheet with tweezers. Use a product like SIG Pure Magic Model Airplane Cleaner, Fantastic®, or Windex® to spray the area of the model that will receive the decal. Then spray the adhesive side of the decal as well. Lightly position the decal in place on the model. The liquid cleaner allows the decal to slide easily into the desired position - do not press down on the decal. Once in position, hold the decal lightly in place with your finger and use a paper towel to gently dab the excess liquid away. Use a small squeegee to now set the decal in place, removing all excess liquid and any air bubbles. The Sig 4" Epoxy Spreader - #SIGSH678 - is perfect for this job. Mop up any excess cleaner with a dry cloth and allow the decals to set overnight. They will be solidly adhered to the model without any air bubbles.



BALANCE:

IMPORTANT: The model is always balanced fully assembled with the prop and spinner in place, the complete radio system installed, and the fuel tank empty.

The correct CG (Center of Gravity) for your Nitro Rascal ARF model is located precisely at the main wing spar location. This means that when you place your fingers, one on each side of the bottom of the wing, at the main spar location, the airplane should balance in a level position. If the nose hangs low, this means the model is "nose heavy". If the tail hangs low, this means the model is "tail heavy". If either of these conditions exist, you must make adjustments to correct the problem. Never attempt to fly your model in an out of balance condition. Since the airborne 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 repositioning the battery pack as needed to correct the problem. In the unlikely event that moving the battery pack will not correct the problem, then stick-on type lead weights may be needed. These are available from your local hobby shop.



PRE-FLIGHT:

Before flying your Nitro Rascal we strongly suggest that you take the time to break-in your engine and adjust the idle to its lowest

possible reliable rpm idle. The high quality of the piston-to-cylinder fit on Norvel engines makes break-in a must before attempting to fly the model. Break the engine in per the factory instructions and DO NOT use the molded plastic spinner provided in this kit during break in. We recommend that you use an electric starter to start the engine the first few times and using the propeller spinner/front thrust washer provided with the engine. This helps to avoid burning the plastic spinner with the electric starter during the break-in process.

We use and highly recommend either SIG "Champion" 15% or 25% fuel for the Norvel® .061 and .074 R/C engines. These fuels have both contain generous oil content, absolutely essential for high-revving smaller 1/2A engines.

ENGINE TIP: Both the Norvel® .061 and .074 R/C engines have an offset head idle stop bolt in the left side of the carburetor body, just behind the needle valve. This bolt is in place to limit the travel of the throttle arm at low throttle. We have found that if this bolt is completely removed, the throttle lever can then move further forward in low throttle movement with the throttle servo. This means that an even lower idle speed can be obtained. However, you must experiment a little to obtain the lowest possible reliable idle speed, without killing the engine. Our experience with this simple modification has given us very reliable low speed idle characteristics and - after adjusting the trims on our transmitter - even the ability to use the "Throttle Cut" feature that is available on some transmitters.

FLYING:

If you are new to the hobby/sport of flying R/C model airplanes, **DO NOT** attempt to fly this model by yourself! There are hundreds of AMA (Academy of Model Aeronautics) chartered R/C clubs in the U.S. The easiest way to find clubs in your area is by simply asking your local hobby retailer. AMA chartered clubs often have qualified instructors who can teach you how to fly and perhaps even test fly your model for you. If you are already an R/C pilot, then you will likely have no problems at all with the Nitro Rascal.

Choose a calm day with little or no wind for the initial flights. This is important in getting the model properly trimmed. We also suggest that for the first few familiarization flight you or a flying buddy hand-launch the model. When hand-launching, the airplane

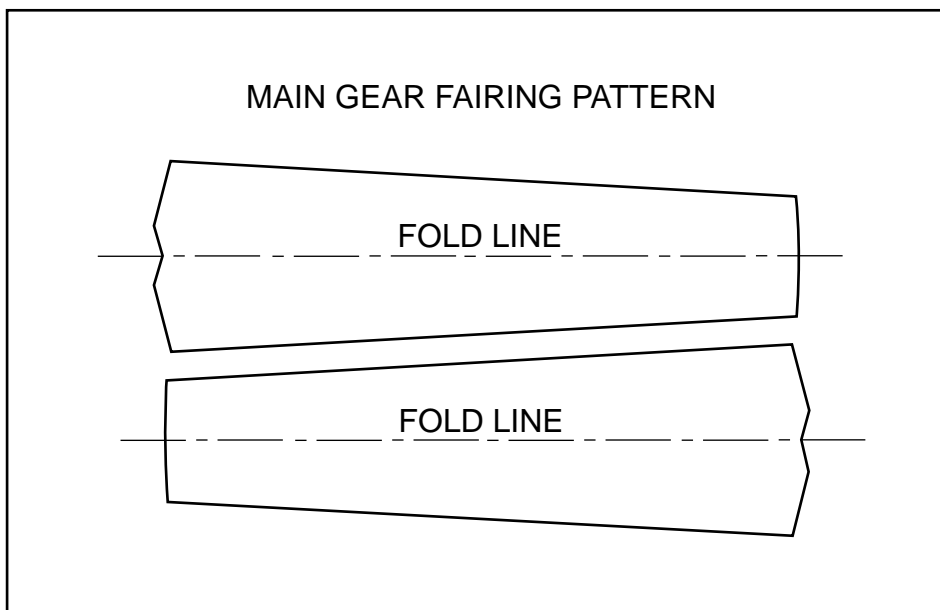
must be launched straight and level directly into the wind, with the nose aimed at a point on the ground about 75' in front of you. **NEVER** launch the model with the nose pointed up or the wings tipped to one side or the other. The launch should be firm enough to achieve flight speed but not overly hard. Later, when you're more familiar with the airplane and how it flies, you can perform R.O.G. (Rise Off Ground) takeoffs from smooth surfaces.

Using full throttle at launch is recommended. Fly the model to a comfortable altitude and throttle back the engine to a comfortable cruising speed. Use the transmitter trims to adjust the model for straight and level flight. Once the model is trimmed to your liking you can begin to explore the Nitro Rascal's flight envelope. Throttle all the way back and get familiar with the low speed flight characteristics. This is great information to have when it comes time to set-up your first landing. While still at low throttle, test the airplane's stall characteristics. Using the initial control movements in this manual, we think you will find the stall fairly uneventful and easy to control.

Throttle up and gain some altitude. The Nitro Rascal is capable of some really nice 3-channel aerobatics, such as rudder rolls, inverted flight, snap rolls, spins, high-speed passes, etc. It can do all of this in a very small amount of flying space. The more you fly your Nitro Rascal the more you will begin to appreciate the airplane's agility and throttle reaction.

Landing your Nitro Rascal is typically a pleasure. Throttle back to achieve a shallow rate of descent, turn into the wind and allow the airplane to settle in smoothly to a 3-point landing. With a little either experience, you'll be landing your Nitro Rascal right in front of you every time!

IMPORTANT NOTE: The Nitro Rascal ARF is a small, highly maneuverable R/C model aircraft that can easily be flown in smaller flying sites. However, it should always be flown in areas that are appropriate for such models. **NEVER** fly this model in close proximity to people, houses, etc. It is always best to fly this model at flying sites specifically designated for R/C models. Do yourself a favor and join your local R/C club - you'll almost always get assistance and good advice and you might even make a new friend or two!



WARNING! THIS IS NOT A TOY!

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

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

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

AMA WEB SITE: modelaircraft.org

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P.O. Box 520
Montezuma, IA 50171-0520

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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.