

## **Instruction Manual**



# SONIC

## HIGH WING MK2 GP/EP.25-.32 ARF SCALE 1:10

#### **SPECIFICATION**

Wingspan: 1340mm (52.7in)Length: 1040mm (40.9 in)

**- Flying weight:** 1800-2000 gr

- Wing area: 27 dm2

- Wing loading: 79g/dm2

- Wing type: Naca airfoils

- Covering type: V-kote film

- **Spinner size:** Plastic 53mm (included)

- Radio: 4 channel minimum (not included)

Servo: 5 standard servo: 2 aileron; I elevator;
 I rudder; I throttle (not included)

- Recommended receiver battery:

4.8-6V / 800-1200mAh NiMH (not included)

- Servo mount: 21mm x 42 mm

- Propeller: suit with your engine

**- Engine:** .25-.32 / 2-stroke (not included)

 Motor: brushless outrunner 1200W, 800 KV (not included)

- **Gravity CG:** 65-70 mm (2.5-2.7 in) Back from the leading edge of the wing, at the fuselage

- Control throw Ailerons: Low: 8mm up/down, 10% expo; High: 10mm up/down, 10% expo

- Control throw Elevators: Low: 8mm up/down, 12% expo; High: 10mm up/down, 12% expo

- Control throw Rudder: Low: 25mm right/left, 15% expo; High: 40mm right/left, 15% expo

- Experience level: Intermediate

- **Plane type:** Trainer

#### **RECOMMENDED MOTOR AND BATTERY SET UP**

- Motor: RIMFIRE .32 (not included)

- Lipo cell: 3cells / 2000-3000mAh (not included)

- Esc: 30-40A (not included)

#### **TOOLS AND SUPPLIES NEEDED.**

- Medium C/A glue
- 30 minute epoxy
- 6 minute epoxy
- · Hand or electric drill
- · Assorted drill bits
- · Modeling knife
- Straight edge ruler
- 2 bender plier
- Wire cutters
- · Masking tape
- Thread lock
- · Paper towels
- Rubbing alcohol

#### **SUGGESTION**

To avoid scratching your new airplane, do not unwrap the pieces until they are needed for assembly. Cover your workbench with an old towel or brown paper, both to protect the aircraft and to protect the table. Keep a couple of jars or bowls handy to hold the small parts after you open the bag.

#### **NOTE:**

Please trial fit all the parts. Make sure you have the correct parts and that they fit and are aligned properly before gluing! This will assure proper assembly. The SONIC HIGH WING MK2 GP/EP.25-.32 ARF SCALE 1:10 is hand made from natural materials, every plane is unique and minor adjustments may have to be made. However, you should find the fit superior and assembly simple.

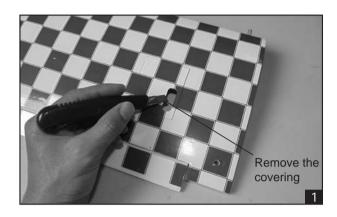
The painted and plastic parts used in this kit are fuel proof. However, they are not tolerant of many harsh chemicals including the following: paint thinner, C/A glue accelerator, C/A glue debonder and acetone. Do not let these chemicals come in contact with the colors on the covering and the plastic parts.

#### **SAFETY PRECAUTION:**

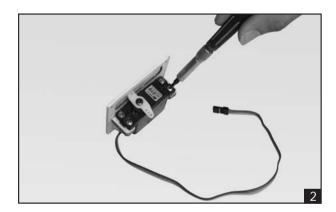
- This is not a toy
- Be sure that no other flyers are using your radio frequency.
- Do not smoke near fuel
- Store fuel in a cool, dry place, away from children and pets.
- · Wear safety glasses.
- The glow plug clip must be securely attached to the glow plug.
- Do not flip the propeller with your fingers.
- Keep loose clothing and wires away from the propeller.
- Do not start the engine if people are near. Do not stand in line with the side of the propeller.
- Make engine adjustments from behind the propeller only. Do not reach around the spinning propeller.

#### **INSTALLING THE AILERON SERVOS**

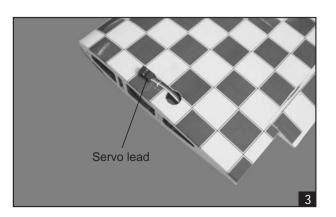
- 1. Install the rubber grommets and brass eyelets onto the aileron servo.
- Using a modeling knife, remove the covering from over the pre-cut servo arm exit hole on the aileron servo tray / hatch. This hole will allow the servo arm to pass through when installing the aileron pushrods.



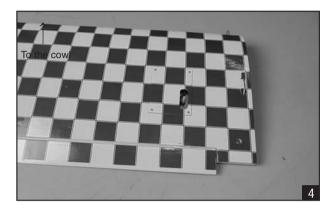
 Place the servo into the servo tray. Center the servo within the tray and drill 1,6mm pilot holes through the block of wood for each of the four mounting screws provided with the servo.



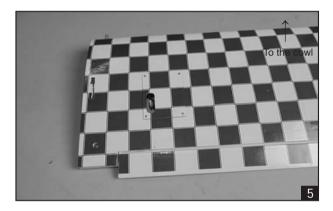
4. Using the thread as a guide and using masking tape, tape the servo lead to the end of the thread: carefully pull the thread out. When you have pulled the servo lead out, remove the masking tape and the servo lead from the thread.



5. Place the aileron servo tray / hatch into the servo box on the bottom of the wing and drill 1,6mm pilot holes through the tray and the servo box for each of the four mounting screws. Secure the servo tray in place using the mounting screws provided (2mm x 12mm).

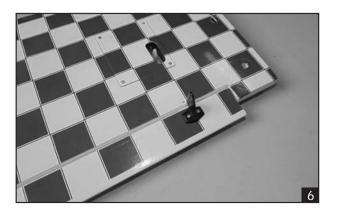


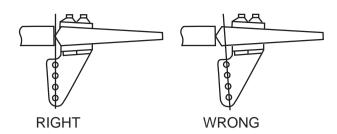
6. Repeat step # 2 - # 5 to install the second aileron servo in the opposite wing half.



#### **INSTALLING THE CONTROL HORNS**

- One aileron control horn in positioned on each aileron. Using a ruler and a pen, locate and mark the location of the control horn. It should be mounted on the bottom side of the aileron at the leading edge, in line with the aileron pushrod.
- 2. Drill two 1.6mm holes through the aileron using the control horn as a guide and screw the control horn in place.

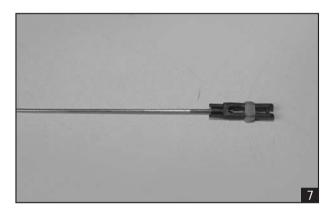




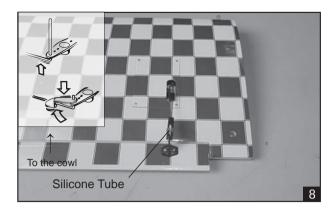
3. Repeat step # 1 - # 2 to install the control horn on the opposite aileron.

#### **INSTALLING THE AILERON LINKAGES**

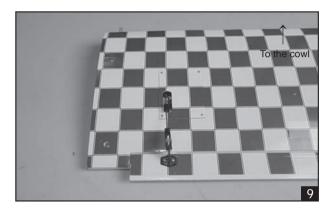
1. Working with the aileron linkage for now, thread one nylon clevis at least 14 turns onto one of the 2mm x 180mm threaded wires.



- 2. Attach the clevis to the outer hole in the control horn. Install a silicone tube on the clevis.
- Locate one nylon servo arm, and using wire cutters, remove all but one of the arms. Using a 2mm drill bit, enlarge the third hole out from the center of the arm to accommodate the aileron pushrod wire.
- Plug the aileron servo into the receiver and center the servo. Install the servo arm onto the servo. The servo arm should be perpendicular to the servo and point toward the middle of the wing.
- 5. Center the aileron and hold it in place using a couple of pieces of masking tape.
- With the aileron and aileron servo centered, carefully place a mark on the aileron pushrod wire where it crosses the hole in the servo arm.
- 7. Using pliers, carefully make a 90 degree bend down at the mark made. Cut off the excess wire, leaving about 4mm beyond the bend.
- 8. Insert the 90 degree bend down through the hole in the servo arm. Install one nylon snap keeper over the wire to secure it to the arm. Install the servo arm retaining screw and remove the masking tape from the aileron.

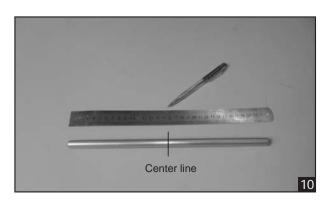


 Repeat step # 4 - # 8 to install the second aileron linkage. After both linkages are completed, connect both of the aileron servo leads using a Y-harness you have purchased separately.

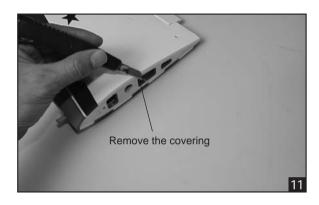


#### **WING ASSEMBLY**

- \*Note\* We highly recommend using 30 Minute Epoxy over faster curing epoxies for several reasons. First, slower curing epoxy is stronger. It also providers more working time, allowing the builder to properly align the parts. Using fast cure epoxy when joining the wing halves could result in the glue drying before the wing halves are aligned properly, causing damage to the wing assembly. Also, when joining the wing halves, the entire area of both center ribs need to be joined completely with no gaps existing. Not following these steps carefully, may result in failure of the wing center section during flight.
- 1) Locate the wing dihedral brace. Using a ruler, locate it's center and place a mark. Draw a vertical line at the mark just made .



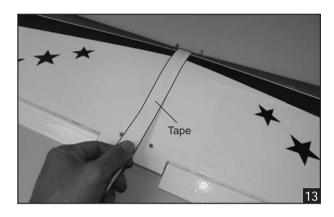
- 2) Test fit the dihedral brace into each wing half. The brace should slide in easily up to the centerline you drew. If it does not, use 220 grit sandpaper with a sanding block and sand down the edges and ends of the brace until the proper fit is obtained.
- 3) When satisfied with the fit of the dihedral brace in each wing half, remove the brace .Mix equal amounts of part A and part B 30 minute epoxy. Coat all sides of the dihedral brace box and half of the wing brace with the epoxy. Make sure to cover the top and bottom as well as the sides. Use enough epoxy to fill any gaps.
- 4) Insert the dihedral brace into one wing half up to the centerline. Wipe off any excess epoxy that may have squeezed out of the joint using paper towels.



- 5) Once the epoxy has cured, trial fit both wing halves together. The center gribs should fit flush together with little or no gaps existing. If gaps do exist, use 220 Grit sandpaper and sand down the high spots on the root ribs and the wing joiner until the proper fit is obtainer.
- 6) To protect the covering from the epoxy used to glue the wing halves together, carefully apply masking tape around the edge of the root rip on the top and bottom of each wing half.



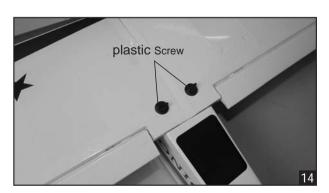
7) Mix a generous amount of 30 minute epoxy. Coat the exposed half of the dihedral brace, the wing joiner box and both root ribs with epoxy. Slide the two wing halves together and carefully align them at the leading and trailing edges. Wipe away any excess epoxy using paper towels. Use masking tape wrapped around the center section to hold the halves in place until the epoxy cures.



- 8) When the epoxy has cured, carefully remove the masking tape from the wing.
- 9) Peel off the backing from the self adhesive covering strip used to cover the center section wing joint seam. Apply the strip to the center section of the wing on the bottom first, and the top using the rest of the material.

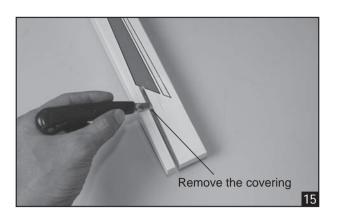
#### **INSTALLING THE WING TO THE FUSELAGE**

Attach the wings to the fuselage and using the nylon thumbscrews to secure the wing panels to the fuselage.

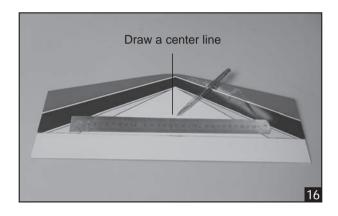


#### **INSTALLING THE HORIZONTAL STABILIZER**

1. Using a modeling knife, cut away the covering from the fuselage for the stabilizer and remove it.



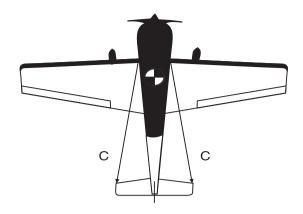
2. Draw a center line onto the horizontal stabilizer.



- 3. Check the fit of the horizontal stabilizer in its slot. Make sure the horizontal stabilizer is square and centered to the fuselage by taking measurements, but don't glue anything yet.
- 4. With the horizontal stabilizer correctly aligned, mark the shape of the fuselage on the top and bottom of the tail plane using a water soluble / non-permanent felt-tip pen.



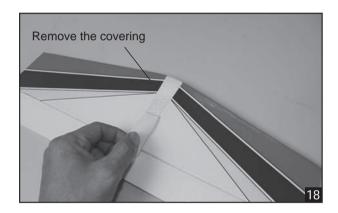




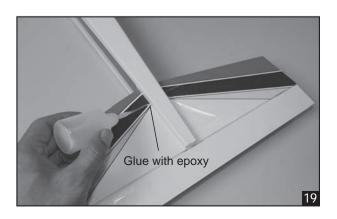
5. Remove the stabilizer. Using the lines you just drew as a guide, carefully remove the covering from between them using a modeling knife.



When cutting through the covering to remove it, cut with only enough pressure to only cut through the covering it's self. Cutting into the balsa structure may weaken it. This could lead to possible failure during flight.



6. When you are sure that everything is aligned correctly, mix up a generous amount of 30 minute epoxy. Apply a thin layer to the top and bottom of the stabilizer mounting area and to the stabilizer mounting platform sides in the fuselage. Slide the stabilizer in place and re-align. Double check all of your measurements one more time before the epoxy cures. Remove any excess epoxy using a paper towel and rubbing alcohol and hold the stabilizer in place with T-pins or masking tape.



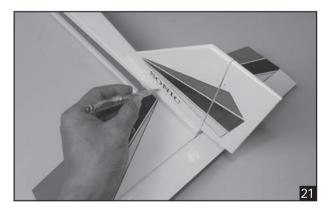
7. After the epoxy has fully cured, remove the masking tape or T-pins used to hold the stabilizer in place and carefully inspect the glue joints. Use more epoxy to fill in any gaps that were not filled previously and clean up the excess using a paper towel and rubbing alcohol.

#### **INSTALLING THE VERTICAL STABILIZER**

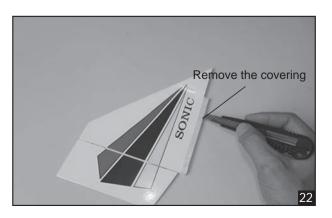
1. Using a modeling knife, remove the covering on the top of the fuselage for the vertical stabilizer.



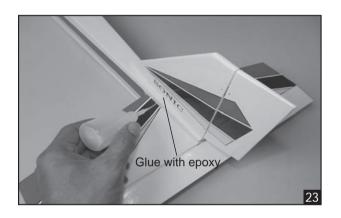
 Slide the vertical stabilizer into the slot in the mounting platform in the top of the fuselage. Mark the shape of the fuselage on the left and right sides of the vertical stabilizer using a felt-tip pen.



3. Now, remove the vertical stabilizer and using a modeling knife, carefully cut just inside the marked lines and remove the film on both sides of the vertical stabilizer. Just as you did with the horizontal stabilizer, make sure you only press hard enough to cut the film, not the balsa vertical stabilizer.

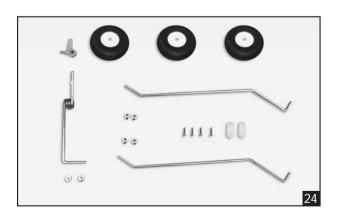


- Slide the vertical stabilizer back in place. Using a triangle, check to ensure that the vertical stabilizer is aligned 90 degree to the horizontal stabilizer.
- 5. When you are sure that everything is a aligned correctly, mix up a generous amount of 30 minute epoxy. Apply a thin layer to the slot in the mounting platform and to the vertical stabilizer mounting area. Apply epoxy to the lower rudder hinge. Set the stabilizer in place and re-align. Double check all of your measurements once more before the epoxy cures. Remove any excess epoxy using a paper towel and rubbing alcohol and hold the stabilizer in place with T-pins or masking tape. Allow the epoxy to fully cure before proceeding.

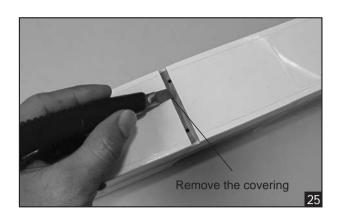


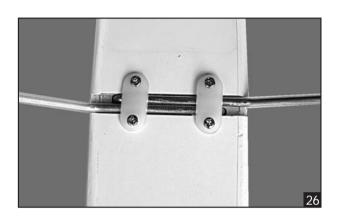


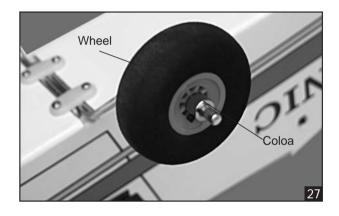
1. Locate the two main landing gear wires, one nose gear wire, four nylon mounting straps eight 3\*12mm Phillips head sheet metal screws, three wheels, six wheel collars w/set screws, and one nylon steering arm with set screw. See photo #12 below.



2. Test fit the two main gear wires into the channels. When satisfied with the fit, secure the wires in place using the two nylon straps and four 3\*12mm sheet metal screws.

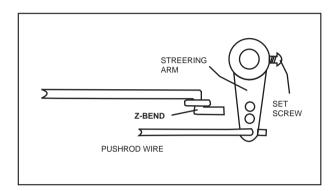




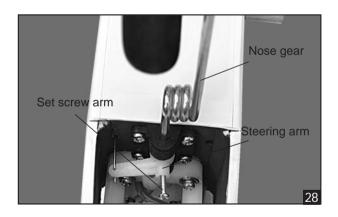


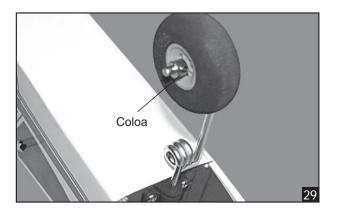
3. Install two of the wheels onto the axles using the four wheel collars and set screws provided. The wheels should be centered on the axles with a wheel collar on each side, holding them in place. Tighten the set screws on the collars to secure them in place. The wheels should rotate freely. You should apply a small drop of lock-Tite thread lock to each set screw to prevent them from coming loose.

- 4. Working with the preinstalled nylon steering housing, position it so the end of it is flush with the front of the firewall. When satisfied with the fit, glue the housing to the firewall from the inside of the fuselage using 5 Minute Epoxy.
- The preinstalled wire steering pushrod has a factory made Z-Bend on the front end of it. Connect the nylon steering arm to this pushrod. The pushrod should be installed in the outermost hole in the steering arm.



6. Locate the nose gear wire. Slide the nose gear wire up through the lower portion of the nose gear block, then through the nylon steering arm, then through the upper portion of the nose gear block. The top of the nose gear wire should be flush with the top of the nose gear bracket.





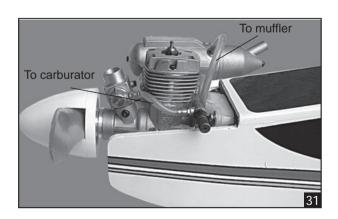
- 7. With the nose gear wire straight, angle the nylon steering arm about 30° forward of the fire-wall and tighten the set screw. Angling the arm forward like this will allow room for the arm to move back for more adequate steering.
- 8. Install the remaining wheel onto the axle using the two wheel collars and set screws provided. The wheel should be centered on the axle with a wheel collar on each side, holding it in place. Tighten the set screws on the collars to secure them in place. The wheel should rotate freely. You should apply a small drop of Lock\_tite thread lock to each set screw to prevent them from coming loose.

#### **INSTALLING THE ENGINE**

1. Install the engine mount to the fuselage.



2. Locate the long piece of wire used for the throttle pushrod. One end of the wire has been pre-bend in to a "Z" bend at the factory. This "Z" bend should be inserted into the throttle arm of the engine when the engine is fitted onto the engine mount. Fit the engine to the engine mount using the screws provided.

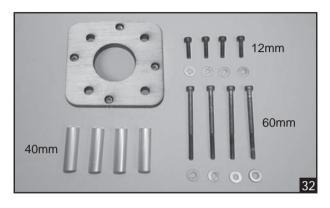


#### **INSTALLING THE MOTOR AND BATTERY**

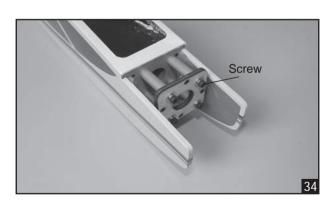
#### Installing the electric motor

This model can fly with electric, here is our recommended for set up the system.

- Motor brushless: Rimfire .32
- Lipo cells: 3 cells / 2000 3000 mAh.
- ESC: 30A 40A.

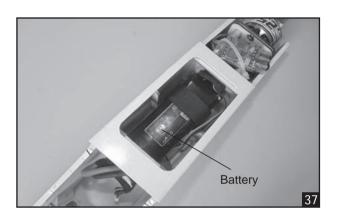






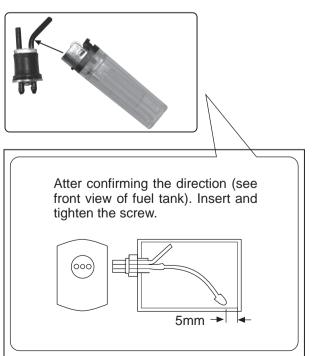




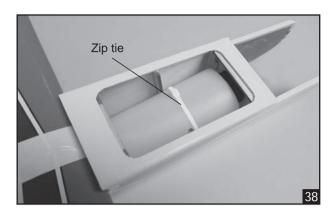


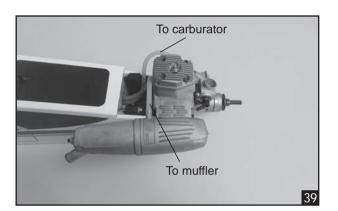
#### **FUEL TANK INSTALLATION**

1. Assemble the fuel tank.



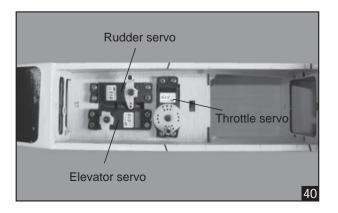
2. Slide the fuel tank in the fuselage using foam rubber to cushion the tank, and route the fuel lines out the hole in the firewall.





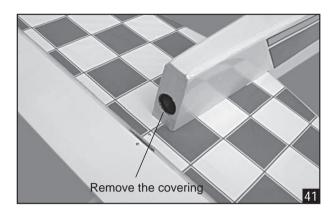
## SERVO INSTALLATION INSTALLING THE FUSELAGE SERVOS

- Install the rubber grommets and brass collets into the elevator, rudder and throttle servos. Test fit the servos into the servo tray. Trim the tray if necessary to fit your servos
- 2. Mount the servos to the tray using the mounting screws provided with your radio system.

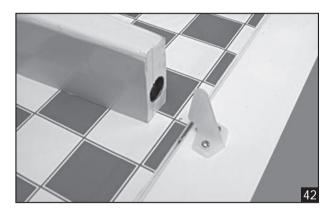


#### **INSTALLING THE ELEVATOR PUSHROD**

1. Carefully cut away the covering.



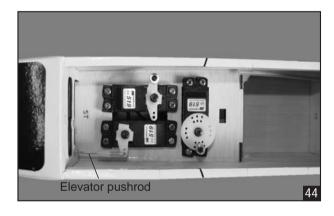
- Working from inside the fuselage, slide the threaded end of the pushrod until it reaches the exit slot.
- 3. Install the clevis on the elevator pushrod. Make sure 6mm of thread shows inside the clevis.
- 4. The control horn should be mounted on the bottom, of the elevator at the leading edge, in line with the elevator pushrod.
- 5. Drill two holes through the elevator using the control horn as a guide and screw the control horn in place.



6. Attach clevis to the third hole in the control horn. Install a silicone tube on the clevis.



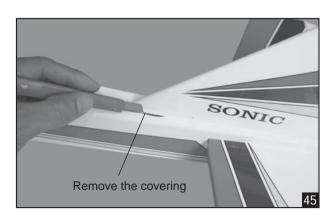
- Locate one nylon servo arm, and using wire cutters, remove all but one of the arms. Using a 2mm drill bit, enlarge the third hole out from the center to accommodate the elevator pushrod wire.
- 8. Plug the elevator servo into the receiver and center the servo. Install the servo arm onto the servo. The servo arm should be perpendicular to the servo and point toward the middle of the fuselage.
- 9. With the elevator and elevator servo centered, carefully place a mark on the elevator pushrod wire where it crosses the hole in the servo arm.
- 10. Using pliers, carefully make a 90 degree bend up at the mark made. Cut off the excess wire, leaving about 8mm beyond the bend.
- 11. Insert the 90 degree bend up through the hole in the servo arm, install one nylon snap keeper over the wire to secure it to the arm. Install the servo arm retaining screw and remove the masking tape the elevator halves.



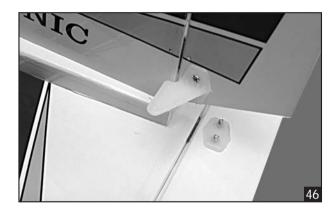
12. Using thick CA glue, secure the pushrod sleeves to the pushrod sleeve guide.

#### **INSTALLING THE RUDDER PUSHROD**

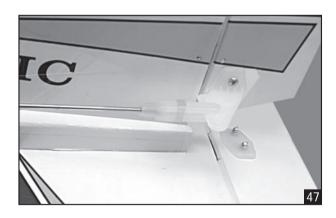
- Locate the pushrod exit slot on the left of the fuselage.
- Carefully cut away the covering material from the slot.



- Working from inside the fuselage, slide the threaded end of the remaining pushrod down the inside of the fuselage until the pushrod reaches the exit slot. Carefully reach in with a small screw driver and guide the pushrod out of the exit slot.
- 4. Install the clevis on the rudder pushrod. Make sure 6mm of thread shows inside the clevis.
- 5. The control horn should be mounted on the left side of the rudder at the leading edge, in line with the rudder pushrod.
- 6. Drill two holes through the rudder using the control horn as a guide and screw the control horn in place.

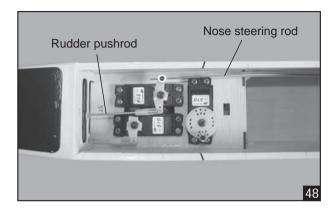


7. Attach clevis to the third hole in the control horn. Install a silicone tube on the clevis.



- 8. Locate one nylon servo arm, and using wire cutters, remove all but one of the arms using a 2mm drill bit, enlarge the third hole out from the center to accommodate the rudder pushrod wire.
- Plug the rudder servo into the receiver and center the servo. Install the servo arm onto the servo.
- 10. Center the rudder and hold it in place using a piece of masking tape.
- 11. With the rudder and rudder servo centered, carefully place a mark on the rudder pushrod wire where it crosses the hole in the servo arm.

12. Using a pliers, carefully make a 90 degree bend up at the mark made. Cut off excess wire, leaving about 8mm beyond the bend.



- 13. Insert the 90 degree bend up through the hole in the servo arm. Install one nylon snap keeper over the wire to secure it to the arm. Install the servo arm retaining screw and remove the masking tape from the rudder.
- 14. Using thick CA glue, secure the pushrod sleeves to the pushrod sleeve guide.

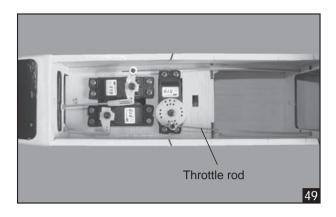
#### **INSTALLING THE THROTTLE**

 Install one adjustable metal connector through the third hole out from the center of one servo arm, enlarge the hole in the servo arm using a 2mm drill bit to accommodate the servo connector. Remove the excess material from the arm.



After installing the adjustable metal connector apply a small drop of thin C/A to the bottom nut. This will prevent the connector from loosening during flight.

- 2. Plug the throttle servo into the receiver and turn on the radio system. Check to ensure that the throttle servo output shaft is moving in the correct direction. When the throttle stick is moved forward from idle to full throttle, the throttle barrel should also open and close using this motion. If not, reverse the direction of the servo, using the transmitter.
- Slide the adjustable metal connector / servo arm assembly over the plain end of the pushrod wire. Position the throttle stick and the throttle trim at their lowest positions.
- 4. Manually push the carburator barrel fully closed. Angle the arm back about 45 degree from center and attach the servo arm onto the servo. With the carburator barrel fully closed, tighte the set screw in the adjustable metal connector.
- Remove the excess throttle pushrod wire using wire cutters and install the servo arm retaining screw.



#### **FINAL ASSEMBLY**

#### **INSTALLING THE SPINNER**

Install the spinner back-plate, propeller and spinner cone. The spinner cone is held in place using two 3mm x 12mm wood screws.



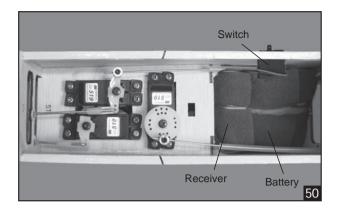
The propeller should not touch any part of the spinner cone. If it dose, use a sharp modeling knife and carefully trim away the spinner cone where the propeller comes in contact with it.

#### **INSTALLING THE RECEIVER AND BATTERY**

- Plug the servo leads and the switch lead into the receiver. You may want to plug an aileron extension into the receiver to make plugging in the aileron servo lead easier when you are installing the wing. Plug the battery pack lead into the switch.
- Wrap the receiver and battery pack in the protective foam to protect them from vibration. Use a rubber band or masking tape to hold the foam in place.

#### **INSTALLING THE SWITCH**

- The switch should be mounted on the fuselage side, opposite the muffler, close enough to the receiver so the lead will reach. Use the face plate of the switch cut out and locate the mounting holes.
- 2. Cut out the switch hole using a modeling knife. Use a 2mm drill bit and drill out the two mounting holes through the fuselage side.
- 3. Secure the switch in place using the two machine screws provided with the radio system.

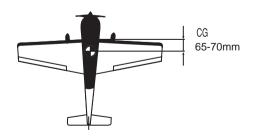


#### **BALANCING**

1. It is critical that your airplane be balanced correctly. Improper balance will cause your plane to lose control and crash.

THE CENTER OF GRAVITY IS LOCATED 65-70mm BACK FROM THE LEADING EDGE OF THE WING. AT THE FUSELAGE.

- 2. Mount the wing to the fuselage. Using a couple of pieces of masking tape, place them on the top side of the wing 65-70mm back from the leading edge, at the fuselage sides.
- Turn the airplane upside down. Place your fingers on the masking tape and carefully lift the plane.
- 4. If the nose of the plane falls, the plane is heavy nose. To correct this first move the battery pack further back in the fuselage. If this is not possible or does not correct it, stick small amounts of lead weight on the fuselage under the horizontal stabilizer. If the tail of the plane falls, the plane is tail heavy. To correct this, move the battery and receiver forward or if this is not possible, stick weight into the firewall. When balanced correctly, the airplane should sit level or slightly nose down when you lift it up with your fingers.



#### **LATERAL BALANCE**

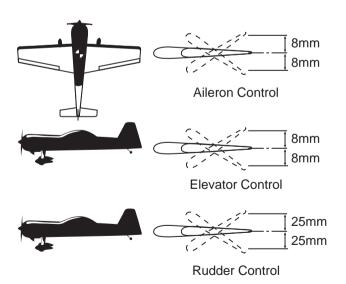
After you have balanced a plane on the C.G. You should laterally balance it. Doing this will help the airplane track straighter.

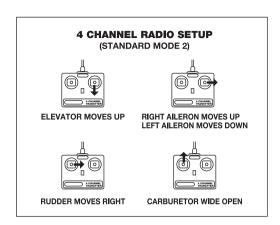
- Turn the airplane upside down. Attach one loop of heavy string to the engine crankshaft and one to the tail wheel wire. With the wings level, carefully lift the airplane by the string. This may require two people to make it easier.
- 2. If one side of the wing fall, that side is heavier than the opposite. Add small amounts of lead weight to the bottom side of the lighter wing half's wing tip. Follow this procedure until the wing stays level when you lift the airplane.

#### **CONTROL THROWS**

- We highly recommend setting up a plane using the control throws listed.
- The control throws should be measured at the widest point of each control surface.
- 3. Check to be sure the control surfaces move in the correct directions.

Elevator		Aileron		Rudder	
LO	8mm	LO	8mm	LO	25mm
HI	10mm	HI	10mm	HI	40mm





#### **FLIGHT PREPARATION PRE FLIGHT CHECK**

- Completely charge your transmitter and receiver batteries before your first day of flying.
- 2. Check every bolt and every glue joint in your plane to ensure that everything is tight and well bonded.
- 3. Double check the balance of the airplane
- 4. Check the control surface
- 5. Check the receiver antenna . It should be fully extended and not coiled up inside the fuselage.
- 6. Properly balance the propeller.

### I/C FLIGHT WARNINGS



Always operate in open areas, away from factories, hospitals, schools, buildings and houses etc. **NEVER** fly your aircraft close to people or built up areas.



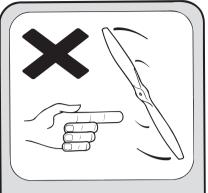
**NEVER** fly near power lines, aerials or other dangerous areas including airports, motorways etc.



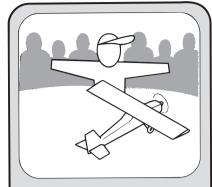
**NEVER** fly in wet conditions or on windy or stormy days.



**ALWAYS** adjust the engine from behind the propeller, and do not allow any part of your body to be in line with the propeller.



THE PROPELLER IS DANGEROUS
Keep fingers, clothing (ties, shirt
sleeves, scarves) or any other loose
objects that could be caught or drawn
in, away from the propeller. Take care
at ALL times.



Keep all onlookers (especially small children and animals) well back from the area of operation. This is a flying aircraft, which will cause serious injury in case of impact with a person or animal.

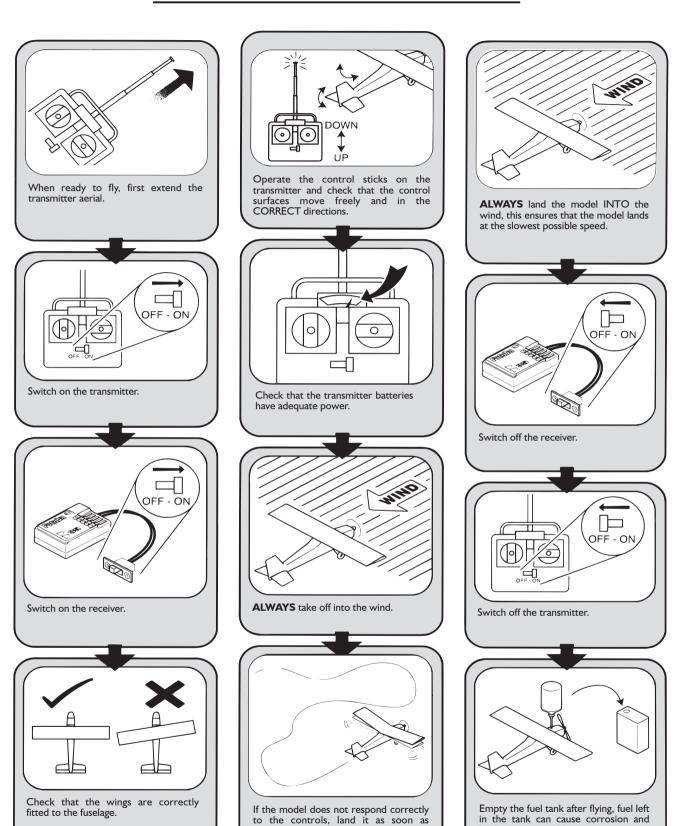


**NEVER** use damaged or deformed propellers or spinners.



**DO NOT** dispose of empty fuel containers on a fire, this can lead to an explosion.

## I/C FLIGHT GUIDELINES



possible and correct the fault.

fitted to the fuselage.

Made in Vietnam

in the tank can cause corrosion and lead to engine problems.