HANGAR 9®

Twist 60 ARF

ASSEMBLY MANUAL



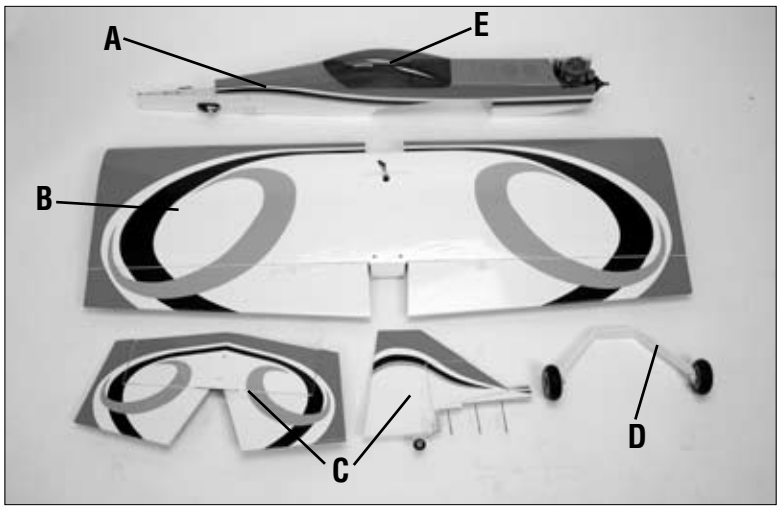
Specifications

Wingspan: ..... 54.75 in (1391mm)	Length: ..... 56.6 in (1438mm)
Wing Area: ..... 992 sq in (64.59 sq dm)	Weight: ..... 6.5–7.5 lb (2.9kg–3.4kg)

Table of Contents

Contents of Kit 3
UltraCote® Covering Colors 3
Radio and Power Systems Requirements 3
Field Equipment Required 4
Optional Field Equipment 4
Required Tools and Adhesives 4
Limited Warranty Period 4
Limited Warranty & Limits of Liability 5
Safety Precautions 5
Questions, Assistance, and Repairs 5
Questions or Assistance 5
Inspection or Repairs 6
Warranty Inspection and Repairs 6
Non-Warranty Repairs 6
Safety, Precautions, and Warnings 7
Before Starting Assembly 7
Using the Manual 7
Section 1: Aileron Servo Installation 8
Section 2: Landing Gear and Tail Installation 11
Section 3A: Two-Stroke Engine Installation 13
Section 3B: Electric Motor Installation 17
Section 4: Final Assembly 20
Control Throws 22
Recommended Center of Gravity (CG) 22
Pre-Flight 23
Adjusting the Engine 23
Range Test Your Radio 23
Maintaining Your Twist 60 ARF 24
Glossary of Terms 25
2006 Official AMA National Model Aircraft Safety Code 26–27

Contents of Kit



Replacement Parts

A.	HAN4201	Fuselage
B.	HAN4202	Wing Set W/Ailerons
C.	HAN4203	Tail Set
D.	HAN4204	Landing Gear
E.	HAN4205	Painted Canopy

Items not shown

HAN4206	Pushrod Set
HAN4207	Nylon Wing Bolts
HAN4208	Decal Set

UltraCote® Covering Colors

- Black HANU874
- Grey HANU882
- White HANU870
- Flame Red HANU883

Radio and Power Systems Requirements

- 4-channel radio system (minimum) w/receiver
- 537 Standard Servo (JRPS537) (5) or equivalent
- (4 required when building the electric version)
- 9" Servo Lead Extension (JRPA097) (2)
- 18" Servo Lead Extension (JRPA099) (2)

Recommended JR Systems

- XP9303
- XP7202
- XP6102
- XP662
- XF631
- XF421EX



JR XP9303



JR XP7202



JR XP6102

Recommended Power Systems

- .60–.61 2-stroke
- .72–.82 4-stroke
- Power 60 Brushless Outrunner



Evolution .61NT
EVOE0610



Saito .82 AAC
SAIE082A



Power 60 Brushless Outrunner Motor,400KV
EFLM4060A

Field Equipment Required

- Propeller
- Long Reach Glow Plug Wrench (HAN2510)
- 2-Cycle Sport Plug (HAN3001)
- 4-Cycle Super Plug (HAN3011)
- Fuel
- Metered Glow Driver w/Ni-Cd & Charger (HAN7101)
- 2-Cycle Super Plug (HAN3006)
- Manual Fuel Pump (HAN118)

Optional Field Equipment

- 12V 7Ah Sealed Battery (HAN102)
- PowerPro™ 12V Starter (HAN161)

Required Tools and Adhesives

Tools

- Square
- Phillips screwdriver
- Drill
- Soldering iron
- Ruler
- Drill bit: 1/16" (1.5mm), 5/64" (2mm), 5/32" (4mm), 11/64" (4.5mm)
- Hobby knife
- Adjustable wrench
- Felt-tipped pen
- Solder

Adhesives

- Thin CA
- CA remover/debonder
- Canopy glue
- 6-minute epoxy
- Pacer Z-42 Threadlock

Other Required Items

- Masking tape
- Deans connector (male) (2)
- 1/4" (6mm) foam
- Deans connector (female)

Limited Warranty Period

Horizon Hobby, Inc. guarantees this product to be free from defects in both material and workmanship at the date of purchase.

Limited Warranty & Limits of Liability

Pursuant to this Limited Warranty, Horizon Hobby, Inc. will, at its option, (i) repair or (ii) replace, any product determined by Horizon Hobby, Inc. to be defective. In the event of a defect, these are your exclusive remedies.

This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone other than an authorized Horizon Hobby, Inc. service center. This warranty is limited to the original purchaser and is not transferable. In no case shall Horizon Hobby's liability exceed the original cost of the purchased product and will not cover consequential, incidental or collateral damage. Horizon Hobby, Inc. reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon Hobby, Inc. Further, Horizon Hobby reserves the right to change or modify this warranty without notice.

REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER. HORIZON HOBBY, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

As Horizon Hobby, Inc. has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the purchaser or user are not prepared to accept the liability associated with the use of this product, you are advised to return this product immediately in new and unused condition to the place of purchase.

Safety Precautions

This is a sophisticated hobby product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this product in a safe and responsible manner could result in injury or damage to the product or other property. This product is not intended for use by children without direct adult supervision.

The product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

Questions, Assistance, and Repairs

Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the product has been started, you must contact Horizon Hobby, Inc. directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance.

Questions or Assistance

For questions or assistance, please direct your email to productsupport@horizonhobby.com, or call 877.504.0233 toll free to speak to a service technician.

Inspection or Repairs

If your product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as Horizon Hobby, Inc. is not responsible for merchandise until it arrives and is accepted at our facility. Include your complete name, address, phone number where you can be reached during business days, RMA number, and a brief summary of the problem. Be sure your name, address, and RMA number are clearly written on the shipping carton.

Warranty Inspection and Repairs

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Providing warranty conditions have been met, your product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

Non-Warranty Repairs

Should your repair not be covered by warranty and the expense exceeds 50% of the retail purchase cost, you will be provided with an estimate advising you of your options. You will be billed for any return freight for non-warranty repairs. Please advise us of your preferred method of payment. Horizon Hobby accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly.

Electronics and engines requiring inspection or repair should be shipped to the following address (freight prepaid):

Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822

All other products requiring inspection or repair should be shipped to the following address (freight prepaid):

Horizon Product Support
4105 Fieldstone Road
Champaign, Illinois 61822

Safety, Precautions, and Warnings

As the user of this product, you are solely responsible for operating it in manner that does not endanger yourself and others or result in damage to the product or the property of others.

Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) that you use.

This model is controlled by a radio signal that is subject to interference from many sources outside your control. This interference can cause momentary loss of control so it is necessary to always keep a safe distance in all directions around your model, as this margin will help to avoid collisions or injury.

- Always operate your model in an open area away from cars, traffic, or people.
- Avoid operating your model in the street where injury or damage can occur.
- Never operate the model out into the street or populated areas for any reason.
- Never operate your model with low transmitter batteries.
- Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) that you use.
- Keep all chemicals, small parts and anything electrical out of the reach of children.
- Moisture causes damage to electronics. Avoid water exposure to all equipment not specifically designed and protected for this purpose.

Before Starting Assembly

Before beginning the assembly of the Twist 60, remove each part from its bag for inspection. Closely inspect the fuselage, wing panels, rudder, and stabilizer for damage. If you find any damaged or missing parts, contact the place of purchase.

If you find any wrinkles in the covering, use a heat gun or sealing iron to remove them. Use caution while working around areas where the colors overlap to prevent separating the colors.



HAN101 – Sealing Iron

HAN141 – Sealing Iron Sock



HAN100 – Heat Gun

HAN150 – Covering Glove

Using the Manual

This manual is divided into sections to help make assembly easier to understand, and to provide breaks between each major section. In addition, check boxes have been placed next to each step to keep track of each step completed. Steps with a single box (☐) are performed once, while steps with two boxes (☐ ☐) indicate that the step will require repeating, such as for a right or left wing panel, two servos, etc. Remember to take your time and follow the directions.

Section 1: Aileron Servo Installation

Required Parts

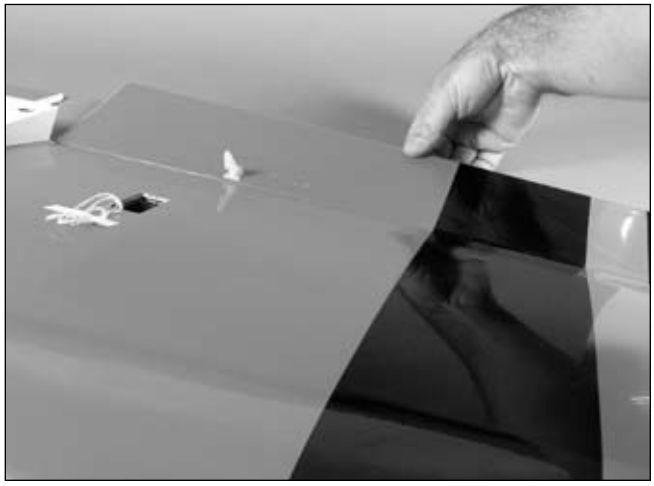
- Wing panel w/ailerons
- Servo w/hardware (2)
- Servo extension, 9" (228mm) (2)
- Pre-assembled 3 1/2" (89mm) aileron linkage (2)

Required Tools and Adhesives

- Drill
- Drill bit: 1/16" (1.5mm), 5/64" (2mm)
- Phillips screwdriver
- Thin CA
- Long servo arm

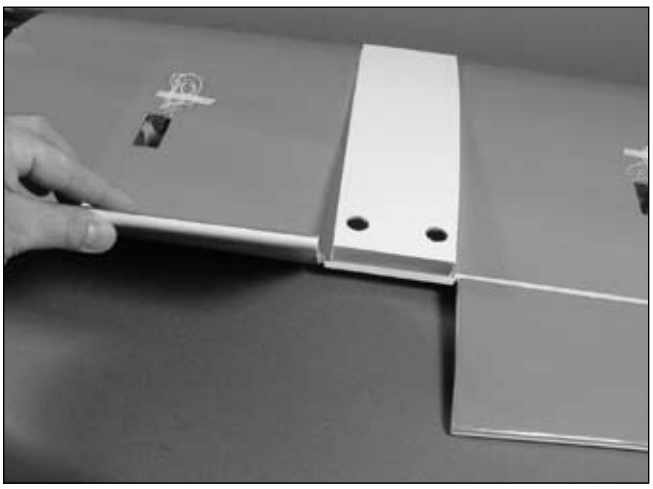
☐ ☐ Step 1

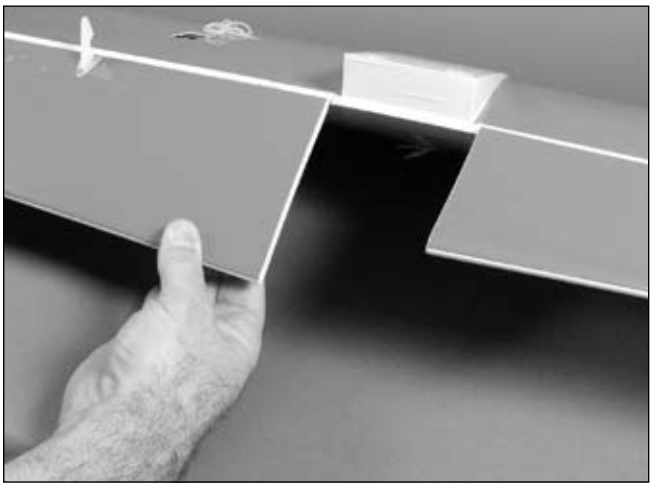
Check to make sure the hinges have been securely glued into place. Gently pull on each aileron to make sure the hinges are secure. Avoid too much pressure which could cause damage to the wing and aileron. Saturate each hinge if you find any that are loose.



☐ ☐ Step 2

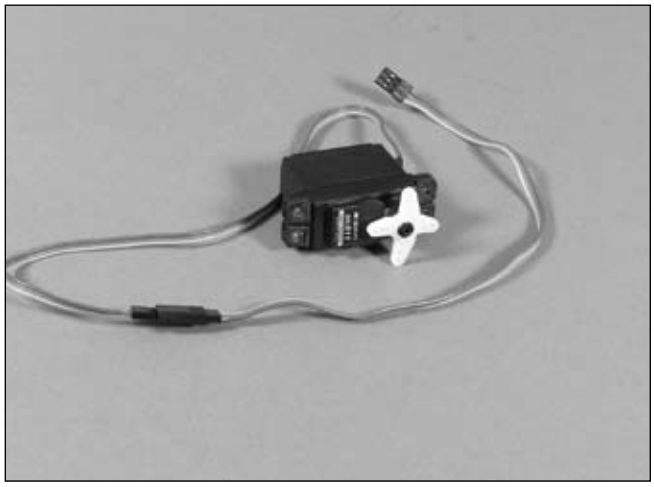
Flex each aileron up and down a number of times to break in the hinges.





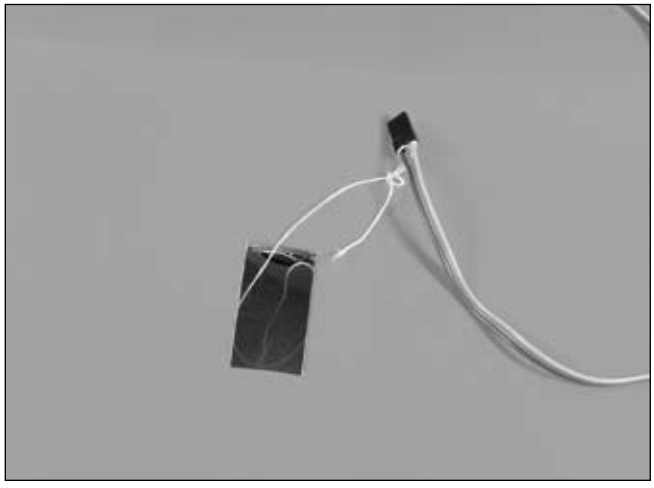
☐ ☐ Step 3

Prepare an aileron servo by installing the grommets and brass eyelets provided with the servo. Secure a 9" (228mm) servo extension to the servo using a commercially available connector or with string or unwaxed dental floss.



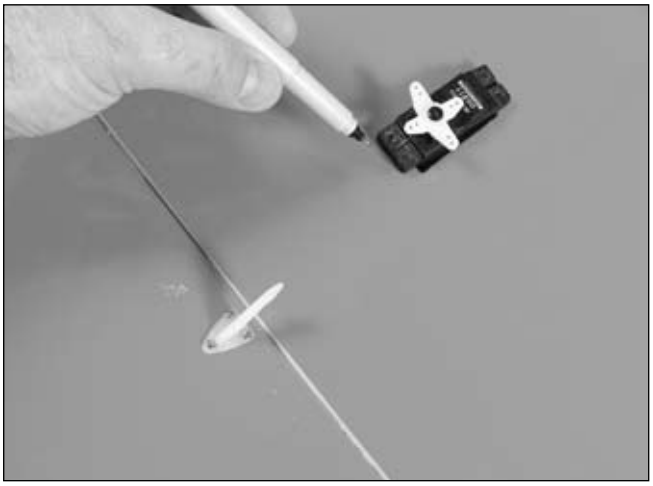
☐ ☐ Step 4

Tie the string that exits the servo opening to the servo extension. Use the string to pull the servo lead through the wing. Use a piece of tape to keep the extension from falling back into the wing.



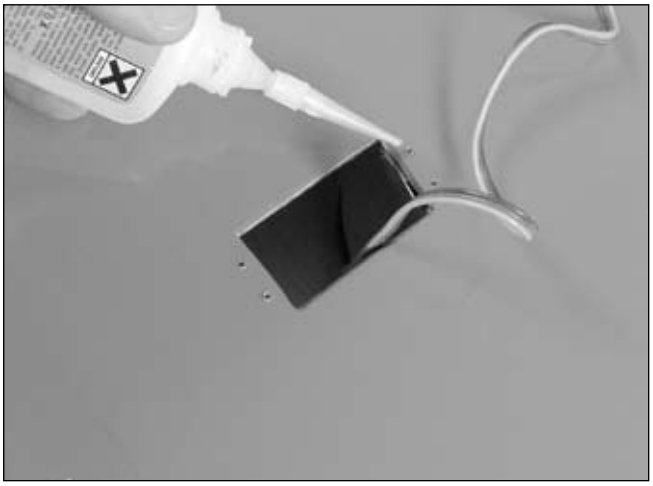
☐ ☐ Step 5

Place the servo into the opening with the servo output towards the trailing edge of the wing. Use a felt-tipped pen to mark the locations for the four servo mounting screws.



☐ ☐ Step 6

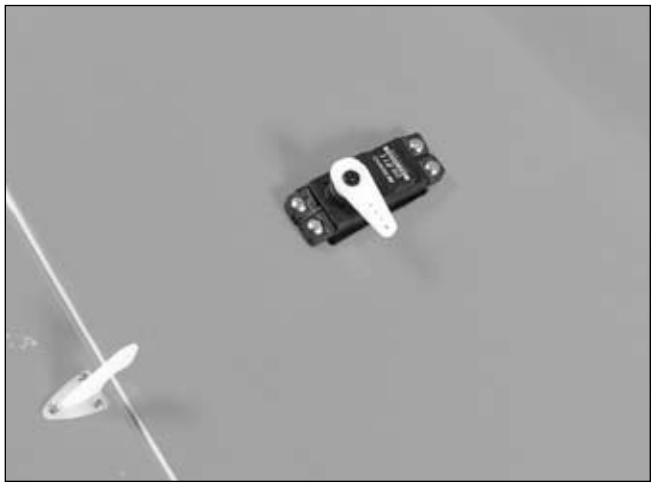
Remove the servo and drill the locations for the servo mounting screws using a 1/16" (1.5mm) drill bit.
Apply a couple drops of thin CA to each hole to harden the wood, which will help in preventing the screws from damaging the wood.



Section 1: Aileron Servo Installation

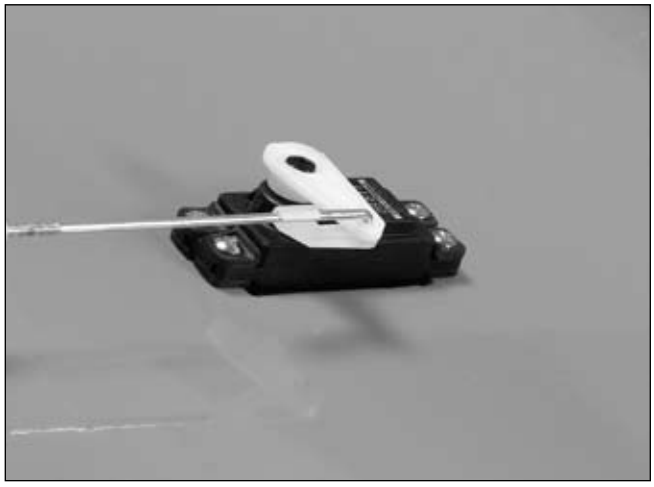
☐ ☐ Step 7

Secure the servo using the screws provided with the servo. Remove the stock servo horn and install a long servo arm in its place. Remove the side of the arm that does not align with the control horn.



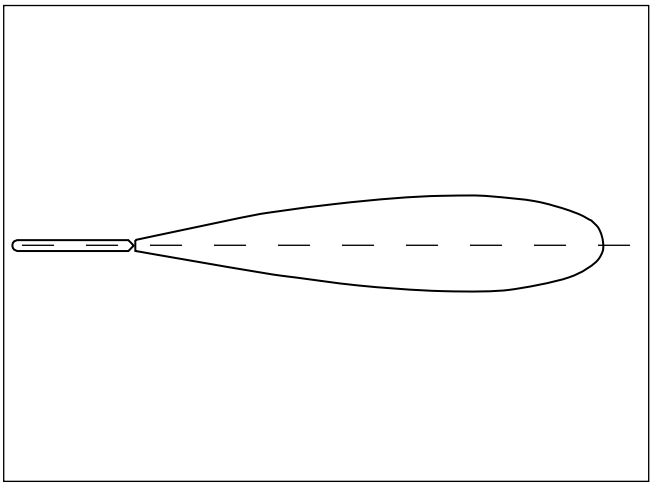
☐ ☐ Step 8

Enlarge the outer hole of the servo arm using a 5/64" (2mm) drill bit. Remove the pushrod keeper from the linkage and slide the bend to the servo arm. Secure the pushrod to the servo arm by replacing the pushrod keeper.



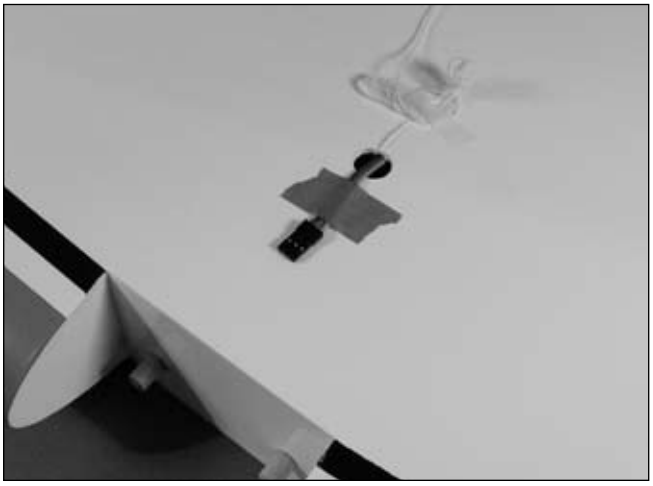
☐ ☐ Step 9

Attach the clevis to the control horn. With the radio system on and the aileron trim and stick centered, check that the aileron is centered when viewed from the wing tip. Adjust the length of the linkage if necessary.



☐ ☐ Step 10

Use tape on the servo lead to prefvent it from falling back into the wing.



☐ Step 11

Repeat Steps 1 through 10 for the remaining aileron servo.

Section 2: Landing Gear and Tail Installation

Required Parts

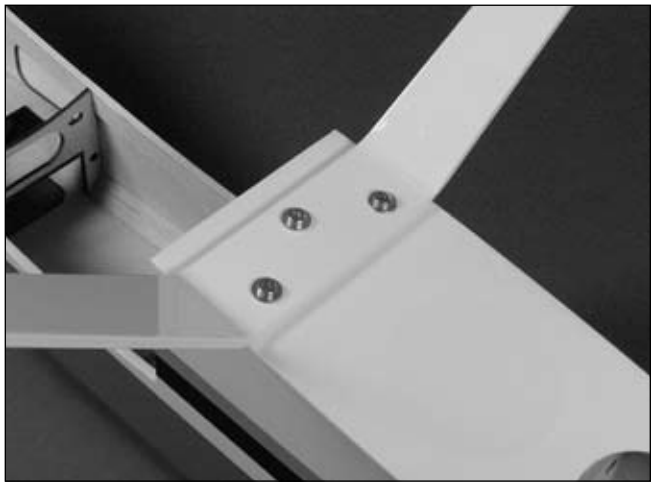
- Landing gear w/wheels
- 1" (25mm) tail wheel
- Stabilizer assembly
- #4 washer (3)
- 5/64" wheel collar
- Fuselage
- Rudder assembly
- 4-40 locknut (3)
- #8 washer (3)
- 4-40 setscrew
- 8-32 x 3/4" machine screw (3)
- Pre-assembled $4\,^{3}/_{4}$" (120mm) rudder linkage
- Pre-assembled $4\,^{1}/_{4}$" (108mm) elevator linkage

Required Tools and Adhesives

- Servo w/hardware (2)
- Long servo arm (2)
- Adjustable wrench
- Threadlock
- 18" (458mm) servo extension (2)

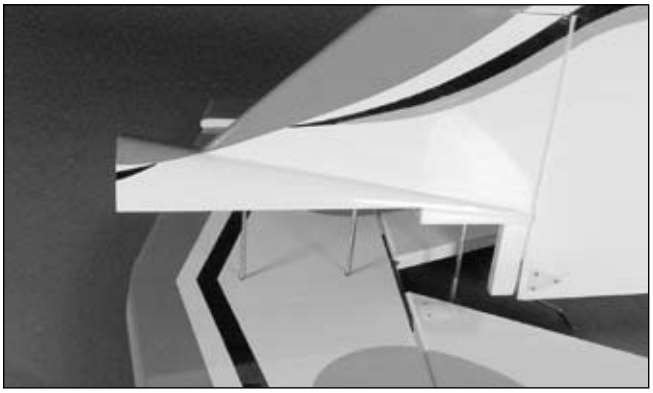
☐ Step 1

Attach the landing gear to the bottom of the fuselage using three 8-32 x 3/4" machine screws and three #8 washers. Put a little threadlock on the screws to prevent them from vibrating loose during flight.



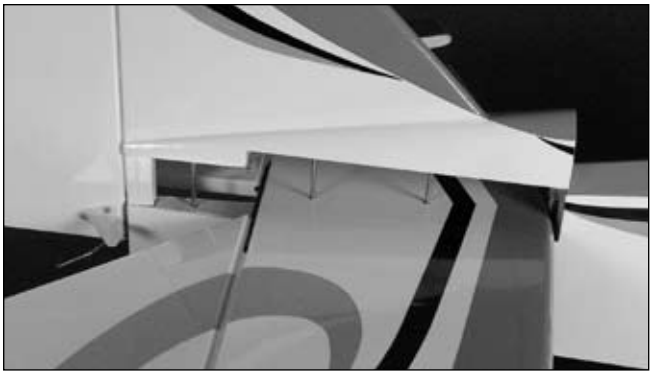
☐ Step 2

Slide the threaded rods from the rudder assembly into the holes in the stabilizer. The two forward rods go through the stabilizer as shown.



☐ Step 3

Slide the rudder/stabilizer onto the fuselage. Guide the threaded rods through the stabilizer saddle then through the holes in the bottom of the fuselage.



☐ Step 4

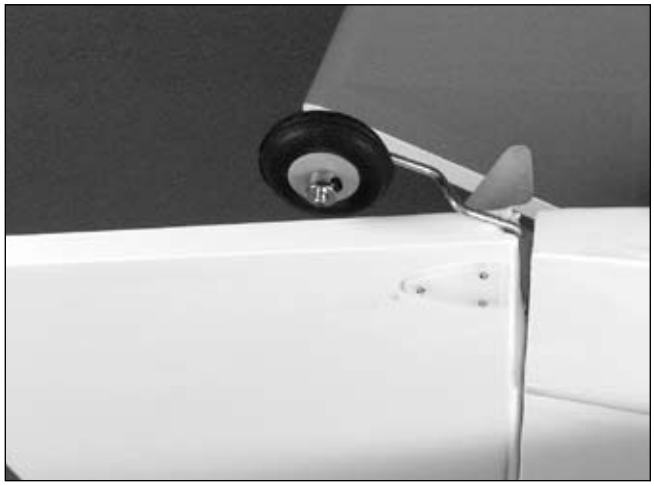
Secure the tail assembly to the fuselage using three #4 washers and three 4-40 locknuts. Do not over-tighten the nuts and crush the fuselage.



Section 2: Landing Gear and Tail Installation

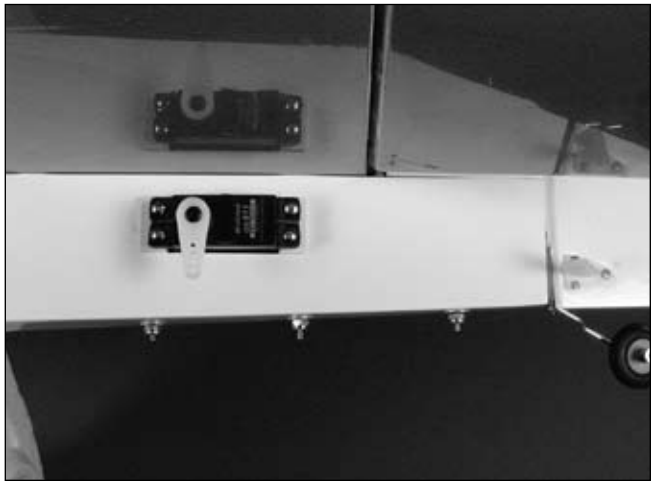
☐ Step 5

Secure the tail wheel into position using the 5/64" wheel collar and the 4-40 setscrew. Use threadlock on the setscrew to prevent it from vibrating loose.



☐ ☐ Step 6

Attach an 18" (458mm) servo extension to the rudder servo. Center the servo using the radio and install a long servo arm onto the servo. Use the photo to determine which arm to trim off, as it will hit the elevator if left in place. Mount the rudder servo into the fuselage using the same procedure as the aileron servo.



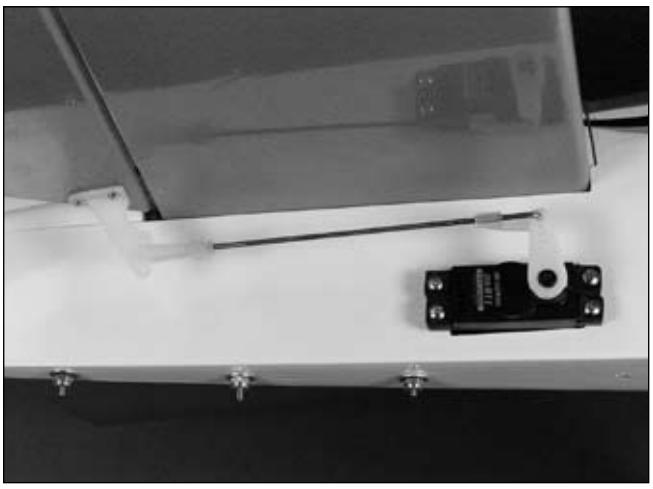
☐ ☐ Step 7

Install the pre-assembled $4\frac{3}{4}$" (120mm) rudder linkage. With the radio on, adjust the length of the linkage so the rudder is centered.



☐ Step 8

Repeat Steps 6 and 7 to install the elevator servo and linkage.



Section 3A: Two-Stroke Engine Installation

Required Parts

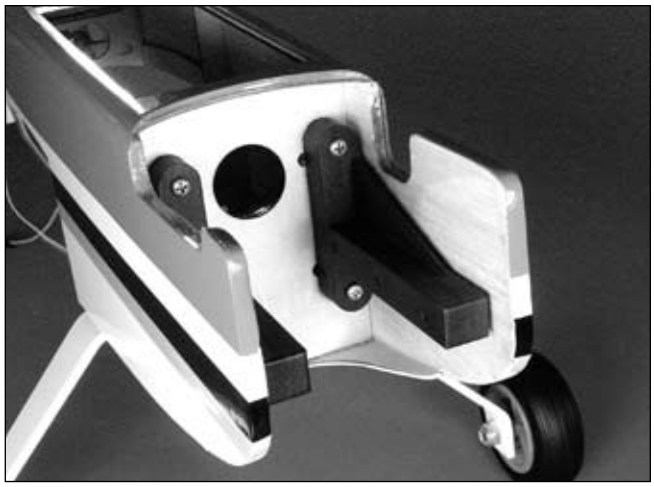
- Fuselage
- 8-32 x 1" screw (4)
- Rubber band (2)
- 8-32 locknut (4)
- 8-32 x $1\frac{1}{4}$" screw (4)
- Engine mount (2)
- #8 washer (4)
- Pushrod connector
- 8-32 blind nut (4)
- $14\frac{1}{2}$" (370mm) pushrod tube
- $16\frac{1}{2}$" (420mm) throttle pushrod
- $2\frac{1}{2}$" (64mm) spinner w/hardware
- Pushrod connector backplate
- 3mm x 5mm machine screw

Required Tools and Adhesives

- Servo w/hardware
- Drill
- Hobby knife
- Drill bit: 1/16" (1.5mm), 5/64" (2mm), 5/32" (4mm)
- Ruler
- Phillips screwdriver

☐ Step 1

Mount the engine mount onto the firewall using four 8-32 x 1" screws and four 8-32 blind nuts.





Note: Use the outer holes for mounting the engine mount.

☐ Step 2

Position the engine on the engine mount so the drive washer is 5" (127mm) ahead of the firewall. Mark the location of the engine mounting bolts using a felt-tipped pen. Use a 5/32" (4mm) drill bit to drill the holes in the engine mount.

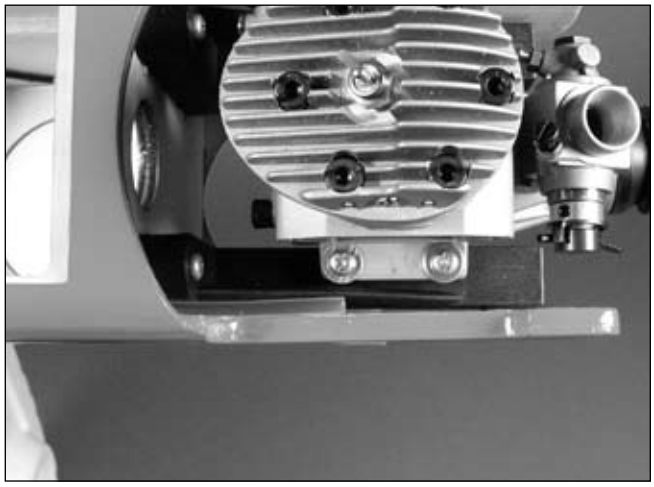


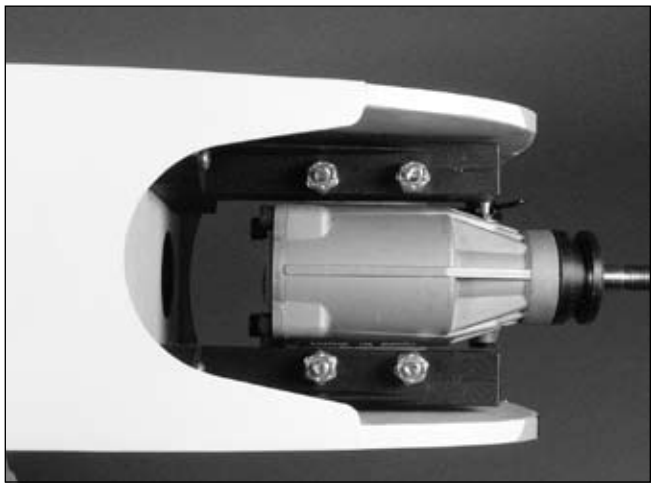
Hint: Use a drill press to get the holes in the mount perpendicular to the mount.

Section 3A: Two-Stroke Engine Installation

☐ Step 3

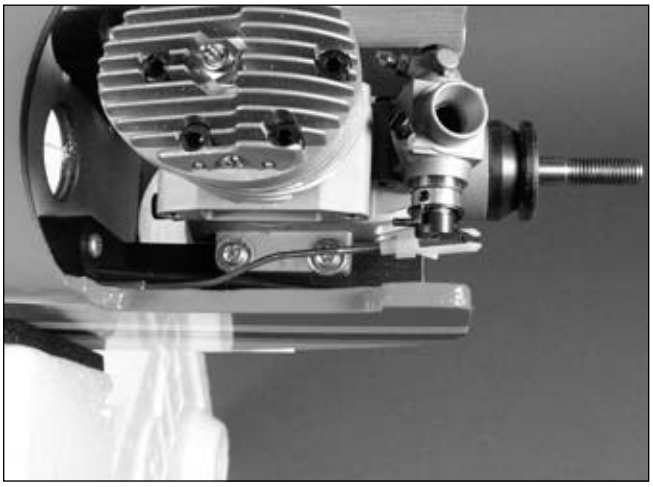
Slide the 14 1/2" (370mm) throttle pushrod tube into the pre-drilled hole in the firewall through to the throttle servo tray. Mount the engine to the mount using four 8-32 x 1 1/4" screws, four #8 washers and four 8-32 locknuts.





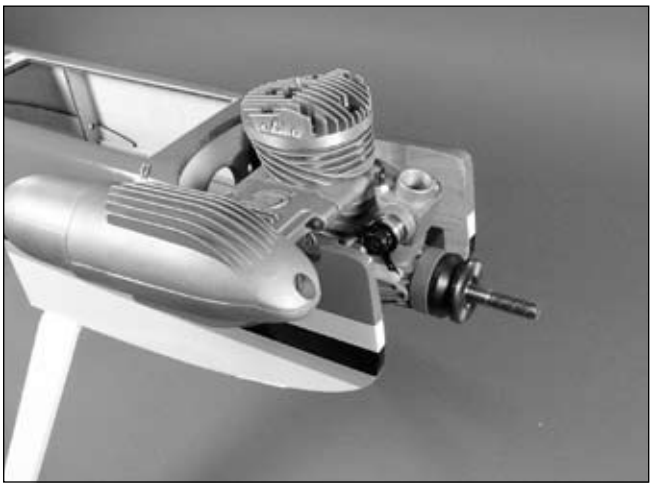
☐ Step 4

Slide the 16 1/2" (420mm) throttle pushrod into the pushrod tube and attach the clevis to the carburetor arm.



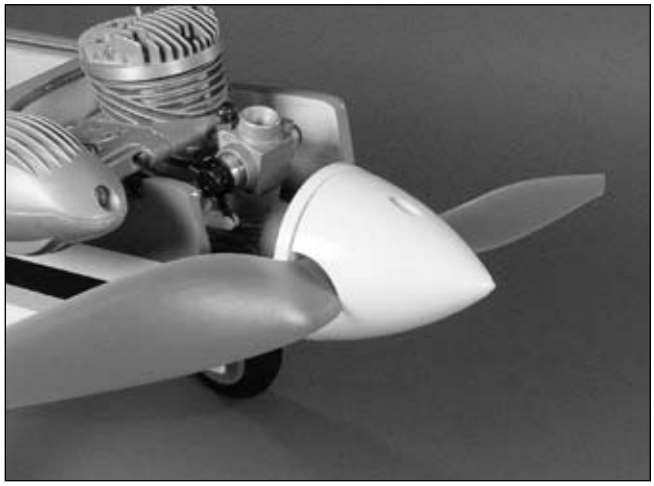
☐ Step 5

Install the muffler onto your engine using the instructions provided with the engine as a guide.



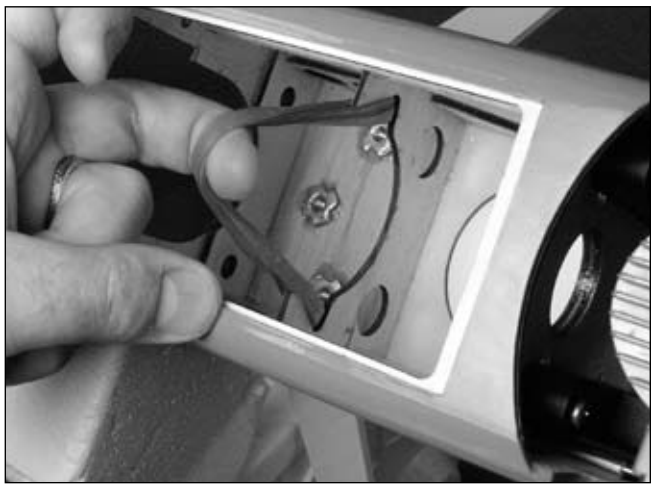
☐ **Step 6**

Install the propeller and spinner onto the engine. Consult the instructions provided with your engine for further details.



☐ **Step 7**

Place the rubber bands into the notches in the former inside the fuselage as shown.



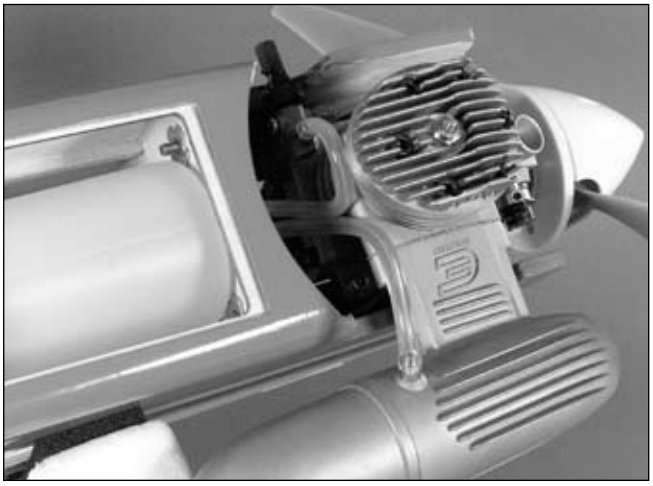
☐ **Step 8**

Place the tank inside the fuselage with the vent towards the top of the fuselage. Use the rubber bands to hold the fuel tank in position inside the fuselage.



☐ **Step 9**

Attach the lines from the fuel tank to the engine. The green line will attach to the fuel inlet, and the red to the muffler pressure.



Section 3A: Two-Stroke Engine Installation

☐ Step 10

Use a hobby knife to remove the covering over the hole in the rear of the fuselage hatch for the 4-40 screw. Place the fuselage hatch into position and secure it using the 4-40 x 1/2" socket head screw.



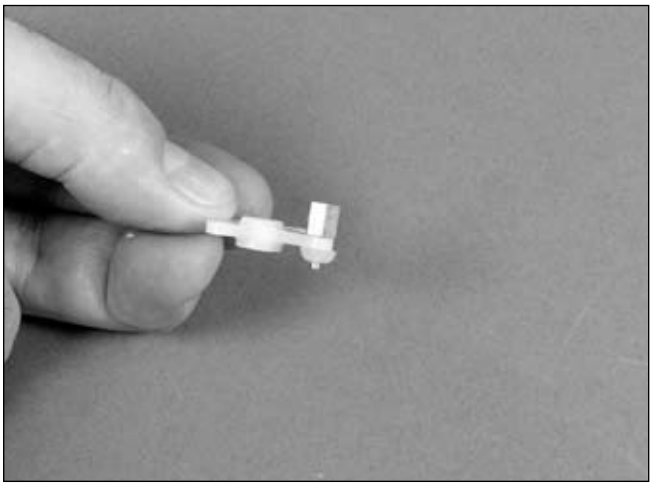
☐ Step 11

Install the throttle servo into the fuselage. Turn on the radio system and center the throttle stick and trim. Slide the pushrod into the brass connector. Position the servo horn onto the servo so the horn is perpendicular to the servo centerline.



☐ Step 12

Remove the servo horn and attach the pushrod connector to the throttle servo arm using the connector backplate. You will need to enlarge the hole in the servo arm using a 5/64" (2mm) drill bit.



☐ Step 13

Use the radio to move the throttle to the low setting using the stick and trim. Move the pushrod so the carburetor is closed. Secure the pushrod wire using a 3mm x 5mm machine screw.



☐ Step 14

Check that the throttle operates from the radio without binding at low and high throttle. Use the ATV setting of the radio or change the position of the clevis at the carburetor or the pushrod connector at the servo to eliminate any binding.

Section 3B: Electric Motor Installation

Required Parts

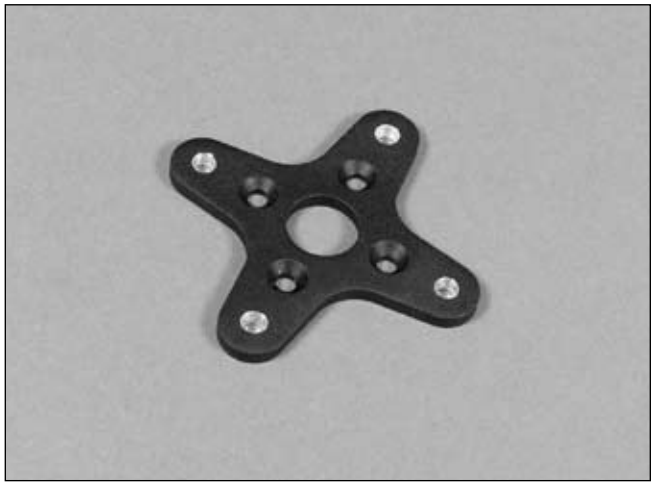
- Fuselage
- 8-32 blind nut (4)
- Plywood battery tray (F&R)
- 2" (51mm) aluminum motor spacer (4)
- 8-32 x 2 1/2" machine screw (4)
- Hook and loop strap (2)
- 2 1/2" (64mm) spinner w/hardware

Required Tools and Adhesives

- Phillips screwdriver
- Threadlock
- Hobby knife
- 6-minute epoxy
- Soldering iron
- Solder
- Drill
- Drill bit: 11/64" (4.5mm)
- Female Deans connector w/wire
- Male Deans connector (3)

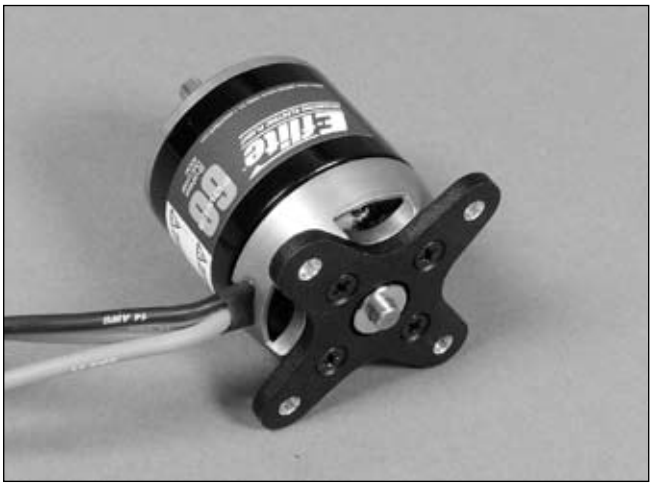
☐ Step 1

Enlarge the outer mounting holes in the X-mount of the motor using an 11/64" (4.5mm) drill.



☐ Step 2

Attach the X-mount to the back of the motor using the hardware provided with the motor. Remember to put a drop of threadlock on each of the screws to prevent them from vibrating loose.



☐ Step 3

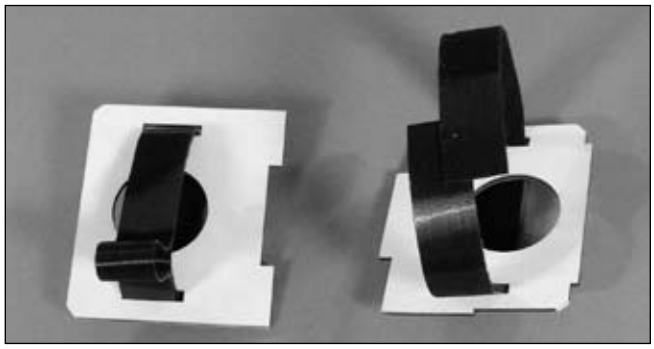
Attach the motor to the firewall using the four 2" (51mm) aluminum motor spacers, four 8-32 x 2 1/2" machine screw and four 8-32 blind nuts. Use the holes that are closer to the opening in the firewall when attaching the motor. Use threadlock on the screws here as well.



Section 3B: Electric Motor Installation

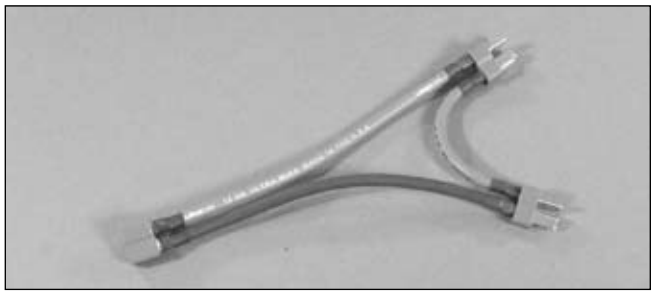
☐ Step 4

Build a wiring harness for the batteries using a female connector and two male connectors. Follow the wiring in the photo so the motor sees the voltage increase of the two batteries.



☐ Step 5

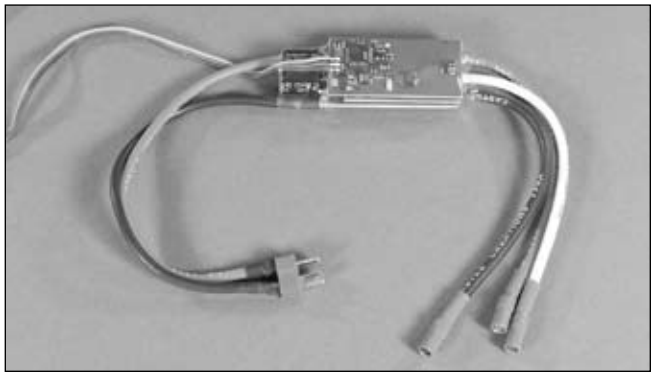
Solder the appropriate connectors onto the speed control.



Note: If you only plan on using this controller in your Twist™, you can combine Steps 4 and 5 by incorporating the harness with the speed control so the controller is positioned in place of the single female connector.

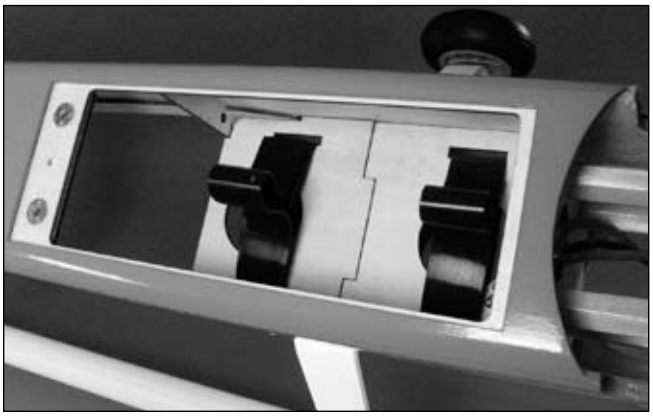
☐ Step 6

Prepare the front and rear battery trays by routing the hook and loop straps through the trays.



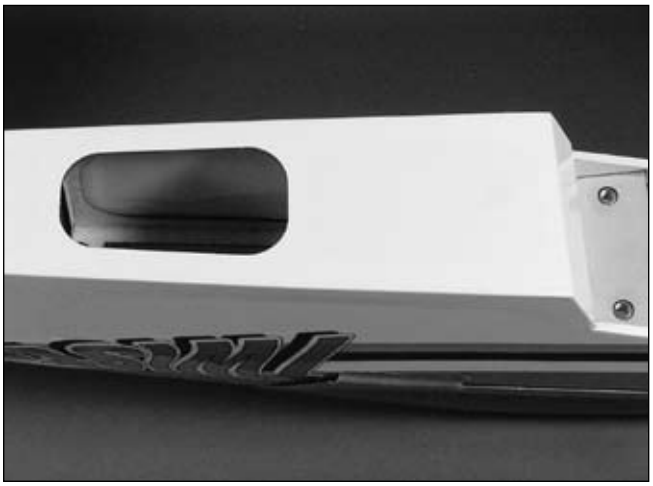
☐ Step 7

Use 6-minute epoxy to glue the front and rear battery tray into the fuselage. The rear tray has a tab that will key into the former, while the front tray fits flush against the backside of the firewall.



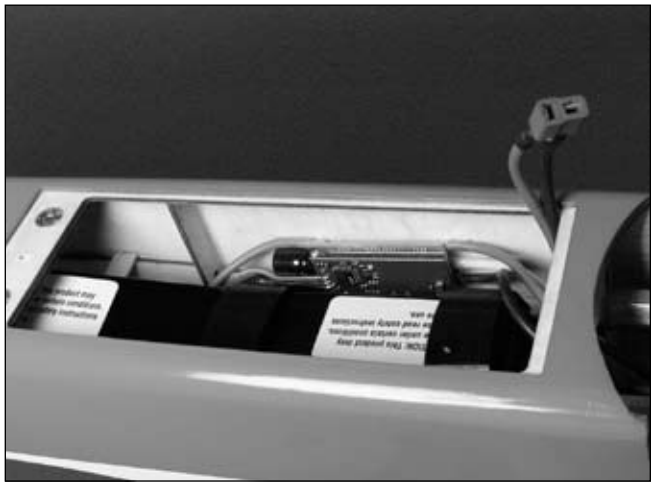
☐ Step 8

Remove the covering from the bottom of the fuselage to allow for cooling air through the fuselage.



☐ Step 9

Plug the motor into the speed control. Secure the batteries using the hook and loop strap. Plug the speed control into the receiver. Mount the speed control inside the fuselage so it will not interfere with the installation and removal of the batteries.



Note: Apply a piece of hook and loop (not included) in the batteries and battery tray if you find the batteries slide forward or aft.

☐ Step 10

Turn on the radio system. Plug the wiring harness assembled in Step 4 into the batteries and speed control. Use the throttle on the transmitter to check that everything is working correctly. Check that the motor is rotating counterclockwise. If not, follow the directions included with the speed control to correct the situation.

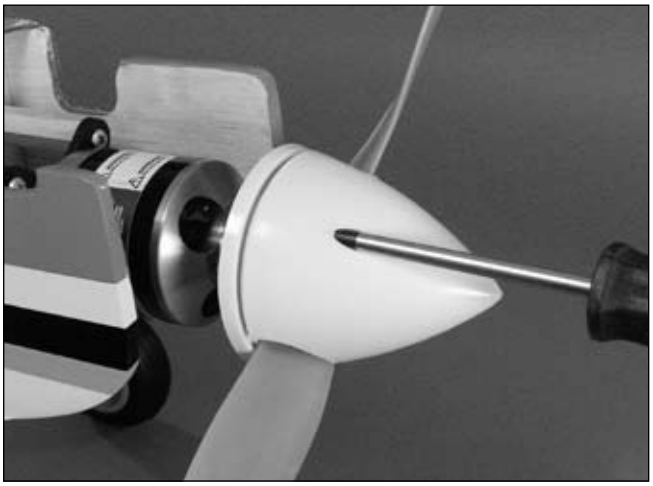
☐ Step 11

Once the motor is working and rotating in the correct direction, unplug the wiring harness for safety. Use a hobby knife to remove the covering from the opening that is closest to the magnets so the hatch can be removed. Snap the battery hatch back onto the fuselage.



☐ Step 12

Install the propeller and spinner using the instructions included with your particular motor.



Section 4: Final Assembly

Required Parts

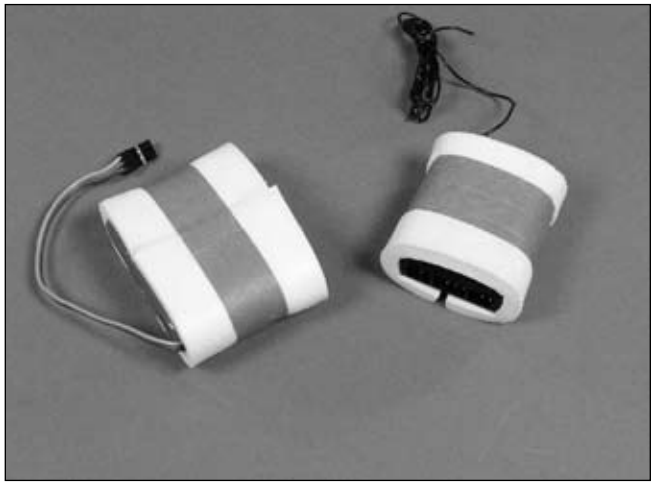
- Fuselage
- Wing
- 1/4-20 x 1 1/2" nylon bolt (2)
- Canopy

Required Tools and Adhesives

- Canopy glue
- Flat screwdriver
- Felt-tipped pen
- Masking tape
- 1/4" foam

☐ **Step 1**

Wrap the receiver and receiver battery in 1/4" foam to protect them from vibration.



☐ **Step 2**

Plug the throttle, elevator and rudder servo leads, as well as the switch harness, into the receiver. Route the receiver antenna to the rear of the fuselage. A tube has been pre-installed for routing the receiver antenna wire.



☐ **Step 3**

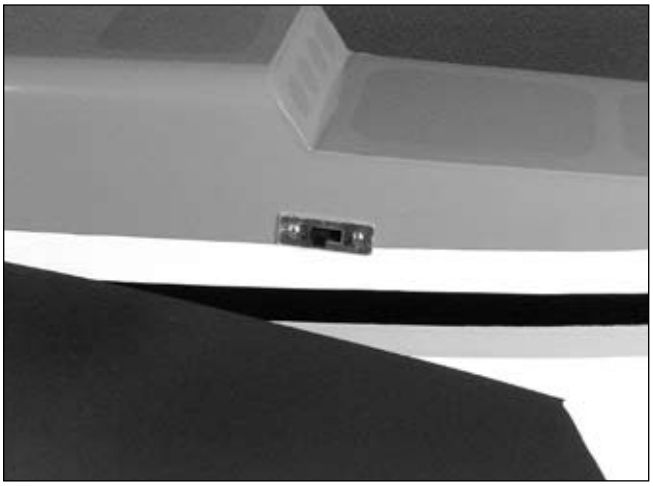
Place the receiver and receiver battery into the fuselage. Use epoxy mixing stick to make braces inside the fuselage to prevent the receiver and receiver battery from shifting during flight.

> **Note**: When using an electrick motor and a smaller 270 mAh pack, you can place the pack underneath the throttle servo tray to provide for more room for the motor batteries.



☐ **Step 4**

Mount the switch harness in the side of the fuselage. The switch should be on the opposite side of the muffler when using a glow engine.



☐ Step 5

Position the canopy onto the fuselage. Use a felt-tipped pen to trace the outline of the canopy onto the fuselage.



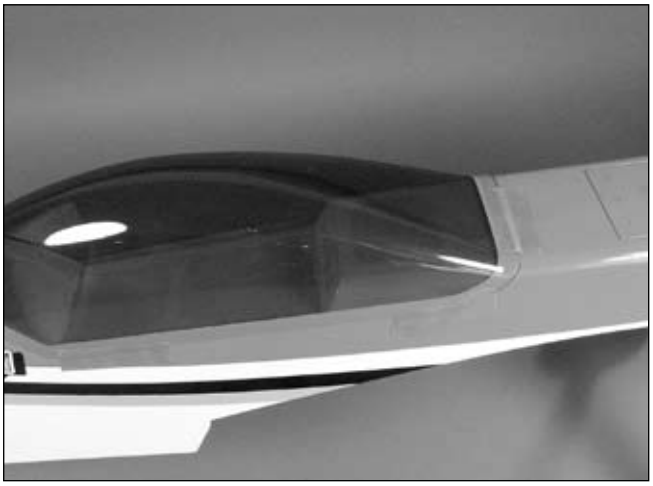
☐ Step 6

Use sandpaper to lightly sand inside the line drawn on the fuselage. Also sand the inside of the canopy where it will rest on the fuselage.



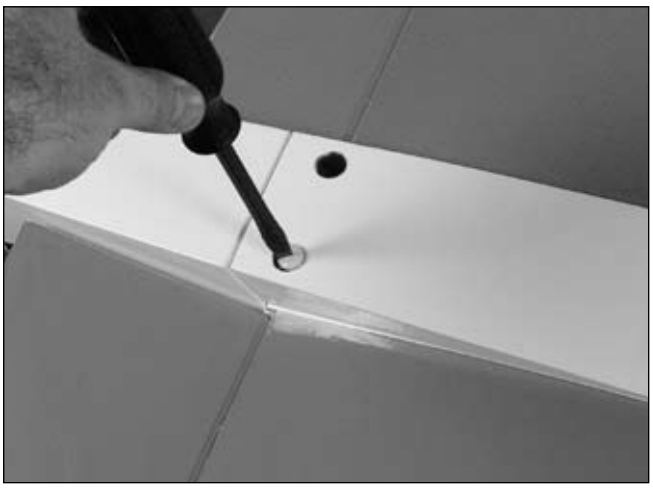
☐ Step 7

Use canopy glue to secure the canopy to the fuselage. Use masking tape to hold the canopy in position until the glue fully cures.



☐ Step 8

Attach the wing to the fuselage using two 1/4-20 x 1 $^{1}/_{2}$" nylon bolts.



Control Throws

The amount of control throw should be adjusted as closely as possible using mechanical means, rather than making large changes electronically at the radio. By moving the position of the clevis at the control horn toward the outermost hole, you will decrease the amount of control throw of the control surface. Moving it toward the control surface will increase the amount of throw. Moving the pushrod wire at the servo arm will have the opposite effect: Moving it closer to center will decrease throw, and away from center will increase throw. Work with a combination of the two to achieve the closest or exact control throws listed.

Aileron Low Rate	7/8" (22mm) up/down
Aileron High Rate	$1\,1/4$" (32mm) up/down

Note: Aileron throw is measured at the trailing edge tip of the aileron.

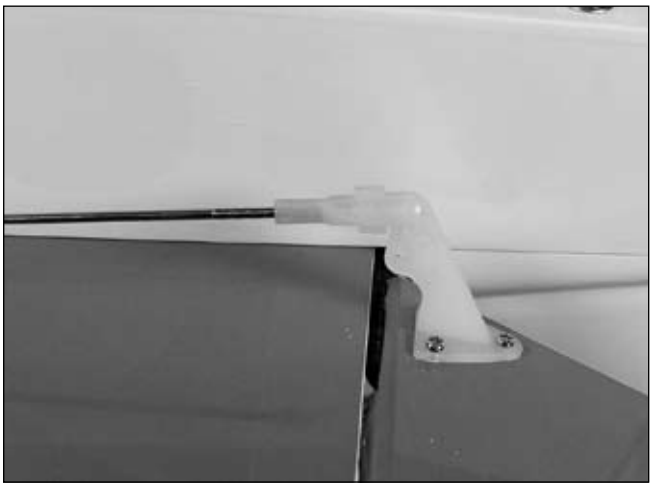
Elevator Low Rate	$1\,1/4$" (32mm) up/down
Elevator High Rate	$2\,3/4$" (70mm) up/down

Note: Elevator throw is measured at the inboard trailing edge of the elevator.

Rudder	4" (102mm) right/left

Note: Rudder throw is measured at the bottom of the rudder.

Once the control throws have been set, slide the clevis retainers over the clevis to prevent them from opening during flight.

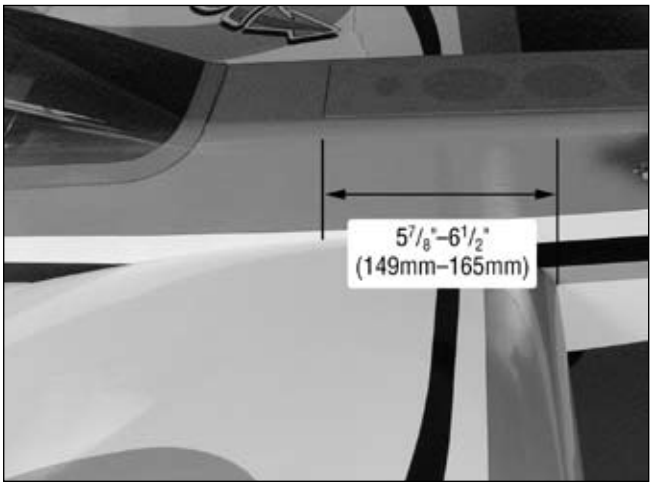


Recommended Center of Gravity (CG)

An important part of preparing the aircraft for flight is properly balancing the model. This is especially important when various engines are mounted.

Caution: Do not inadvertently skip this step!

The recommended Center of Gravity (CG) location for the Twist 60 is $5\,7/8$"–$6\,1/2$" (149mm–165mm) behind the leading edge of the wing against the fuselage. Make sure the aircraft is inverted when measuring the CG. If necessary, move the battery pack or add weight to either the nose or the tail until the correct balance is achieved. Stick-on weights are available at your local hobby store and work well for this purpose.



Pre-Flight

Charge both the transmitter and receiver pack for your airplane. Use the recommended charger supplied with your particular radio system, following the instructions provided with the radio. In most cases, the radio should be charged the night before going out flying.

Check the radio installation and make sure all the control surfaces are moving correctly (i.e. the correct direction and with the recommended throws). Test run the engine and make sure it transitions smoothly from idle to full throttle and back. Also ensure the engine is tuned according to the manufacturer's instructions, and it will run consistently and constantly at full throttle when adjusted.

Check all the control horns, servo horns and clevises to make sure they are secure and in good condition. Replace any items that would be considered questionable. Failure of any of these components in flight would mean the loss of your aircraft.

Adjusting the Engine

☐ **Step 1**

Completely read the instructions included with your engine and follow the recommended break in procedure.

☐ **Step 2**

At the field, adjust the engine to a slightly rich setting at full throttle and adjust the idle and low-speed needle so that a consistent idle is achieved.

☐ **Step 3**

Before you fly, be sure that your engine idles reliably, transitions and runs at all throttle settings. Only when this is achieved should any plane be considered ready for flight.

Range Test Your Radio

Range check your radio system before each flying session. This is accomplished by turning on your transmitter with the antenna collapsed. Turn on the radio in your airplane. With your airplane on the ground, you should be able to walk 30 paces away from your airplane and still have complete control of all functions. If not, don't attempt to fly! Have your radio equipment checked out by the manufacturer.

Maintaining Your Twist 60 ARF

The following is a check list that you should follow every time you have completed a flying session with your Twist 60. Doing so will keep your aircraft in the best flying condition.

Clean Up

If you are flying with a glow engine you will want to clean your Twist 60 before loading it into your vehicle to head home. Use a cleaner such as Windex or 409 and a paper towel to wipe down the exterior of your plane, removing the fuel residue. Remember a clean plane will last longer since the fuel won't be allowed to soak into any exposed wood. Even an electic may need a little cleaning to remove any grass or bugs from the airframe.

Checking the Propeller

Check to make sure the propeller is tightly secured to the engine. If not, remove the spinner and use a crescent wrench to tighten it back down. If you have had any not-so-great landings, you will want to inspect the propeller for any damage. Small nicks and scratches can quickly become fractures, causing the propeller to be unsafe for flight. Always carry a few spare propellers so a damaged propeller can be replaced at the field, increasing your flying time per trip to the field.

Checking the Clevises

Inspect the aileron, elevator and rudder clevises to make sure they are connected and in good working order. If you find a clevis that is showing signs of wear or is broken, replace it with a new clevis. Also check the nylon connectors at the servo for any wear or damage. If they look worn or in bad shape, replace them as well.

Checking the Control Horns

Inspect the control horns to make sure they have not crushed the wood of the control surface. If so, remove the control horn screws to remove the control horn. Place 2–3 drops of thin CA into each of the screw holes. In addition, use a T-pin to poke small holes in the covering in the area where the control horn mounts, then saturate the area with thin CA. This will harden the wood and give the control horns a solid surface to be mounted to.

Checking the Wheel Collars

Check the setscrews on the main and tail wheel wheel collars to make sure they are not loose. Use a 1.5mm hex wrench to tighten the setscrews. It is suggested if they loosen frequently to remove them, apply threadlock to the setscrews, then secure the wheel collars back into position.

Check the Muffler Bolts

If you are flying with a glow engine, use a 2.5mm hex wrench to make sure the bolts holding the muffler onto the engine are tight and have not vibrated loose during flight.

Check the Engine or Motor Mount Bolts

Remove the spinner and propeller from the engine (or motor) and then remove the cowling from the fuselage. Remove the muffler from the engine (if using a glow engine). Use a Phillips screwdriver and adjustable wrench to make sure the four bolts securing the engine to the mount are tight. Use a Phillips screwdriver to check that the bolts holding the mount to the firewall are tight as well.

Glossary of Terms

- **Ailerons**: Each side of this airplane has a hinged control surface (aileron), located on the trailing edge of the wing. Move the aileron stick on the transmitter left, the left aileron moves up and the right aileron moves down. Moving the left aileron up causes more drag and less lift, causing the left wing to drop down. When the right aileron moves down, more lift is created, causing the right wing to rise. This interaction causes the airplane to turn or roll to the left. Perform the opposite actions, and the airplane will roll to the right..
- **Clevis**: The clevis connects the wire end of the pushrod to the control horn of the control surface. A small clip, the clevis has fine threads so that you can adjust the length of the pushrod.
- **Control Horn**: This arm connects the control surface to the clevis and pushrod.
- **Dihedral**: The degree of angle (V-shaped bend) at which the wings intersect the fuselage is called dihedral. More dihedral gives an airplane more aerodynamic stability. Some sailplanes and trainer planes with large dihedral dispense with ailerons and use only the rudder to control the roll and yaw.
- **Elevator**: The hinged control surface on the back of the stabilizer that moves to control the airplane's pitch axis. Pulling the transmitter's control stick toward the bottom of the transmitter moves the elevator upward, and the airplane begins to climb. Push the control stick forward, and the airplane begins to dive.
- **Fuselage**: The main body of an airplane.
- **Hinge**: Flexible pieces used to connect the control surface to the flying surface. All hinges must be glued properly and securely to prevent the airplane from crashing.
- **Horizontal Stabilizer**: The horizontal flying surface of the tail gives the airplane stability while in flight.
- **Leading Edge**: The front of a flying surface.
- **Main Landing Gear**: The wheel and gear assembly the airplane uses to land. It is attached to the bottom of the fuselage.
- **Pitch Axis**: The horizontal plane on which the airplane's nose is raised or lowered. By moving the elevator, you can raise the airplane's nose above the pitch axis (climb) or lower it below the pitch axis (dive).
- **Pushrod**: The rigid mechanism that transfers movement from the servo to the control surface.
- **Roll Axis**: The horizontal plane on which the airplane's wings are raised or lowered. By adjusting the ailerons, you can drop a wing tip below the roll axis and cause the airplane to bank or roll.
- **Rudder**: The hinged control surface on the vertical stabilizer that controls the airplane's yaw. Moving the rudder to the left causes the airplane to yaw left; moving the rudder to the right causes it to yaw right.
- **Servo**: The servo transforms your transmitter commands into physical adjustments of the airplane.
- **Servo Output Arm**: A removable arm or wheel that connects the servo to the pushrod (also called servo horn).
- **Spinner**: Term describing the nose cone that covers the propeller hub.
- **Threadlock**: A liquid that solidifies; used to prevent screws from loosening due to vibration.
- **Torque Rods**: Inserted into the ailerons, these rigid wire rods run along the wing's trailing edge, then bend downward and connect to the pushrod.
- **Vertical Stabilizer**: The vertical flying surface of the tail gives an airplane stability while in flight.
- **Wheel Collar**: The round retaining piece that anchors wheels in place on the wheel axle.
- **Wing**: The lifting surface of an airplane.
- **Yaw Axis**: The vertical plane through which the airplane's nose rotates as it yaws to the left or to the right. The rudder controls the yaw axis.

2006 Official AMA National Model Aircraft Safety Code

GENERAL

1) I will not fly my model aircraft in sanctioned events, air shows or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.

2) I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.

3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

4) The maximum takeoff weight of a model is 55 pounds, except models flown under Experimental Aircraft rules.

5) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. (This does not apply to models while being flown indoors.)

6) I will not operate models with metal-bladed propellers or with gaseous boosts, in which gases other than air enter their internal combustion engine(s); nor will I operate models with extremely hazardous fuels such as those containing tetranitromethane or hydrazine.

7) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind) including, but not limited to, rockets, explosive bombs dropped from models, smoke bombs, all explosive gases (such as hydrogen-filled balloons), or ground mounted devices launching a projectile. The only exceptions permitted are rockets flown in accordance with the National Model Rocketry Safety Code or those permanently attached (as per JATO use); also those items authorized for Air Show Team use as defined by AST Advisory Committee (document available from AMA HQ). In any case, models using rocket motors as a primary means of propulsion are limited to a maximum weight of 3.3 pounds and a G series motor. (A model aircraft is defined as an aircraft with or without engine, not able to carry a human being.)

8) I will not consume alcoholic beverages prior to, nor during, participation in any model operations.

9) Children under 6 years old are only allowed on the flight line as a pilot or while receiving flight instruction.

RADIO CONTROL

1) I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.

2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3) At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in the front of the flight line. Intentional flying behind the flight line is prohibited.

4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission. (Only properly licensed Amateurs are authorized to operate equipment on Amateur Band frequencies.)

2006 Official AMA
National Model Aircraft Safety Code

5) Flying sites separated by three miles or more are considered safe from site-to site interference, even when both sites use the same frequencies. Any circumstances under three miles separation require a frequency management arrangement, which may be either an allocation of specific frequencies for each site or testing to determine that freedom from interference exists. Allocation plans or interference test reports shall be signed by the parties involved and provided to AMA Headquarters. Documents of agreement and reports may exist between (1) two or more AMA Chartered Clubs, (2) AMA clubs and individual AMA members not associated with AMA Clubs, or (3) two or more individual AMA members.

6) For Combat, distance between combat engagement line and spectator line will be 500 feet per cubic inch of engine displacement. (Example: .40 engine = 200 feet.); electric motors will be based on equivalent combustion engine size. Additional safety requirements will be per the RC Combat section of the current Competition Regulations.

7) At air shows or model flying demonstrations, a single straight line must be established, one side of which is for flying, with the other side for spectators.

8) With the exception of events flown under AMA Competition rules, after launch, except for pilots or helpers being used, no powered model may be flown closer than 25 feet to any person.

9) Under no circumstances may a pilot or other person touch a powered model in flight.

Organized RC Racing Event

10) An RC racing event, whether or not an AMA Rule Book event, is one in which model aircraft compete in flight over a prescribed course with the objective of finishing the course faster to determine the winner.

A. In every organized racing event in which contestants, callers and officials are on the course:

1. All officials, callers and contestants must properly wear helmets, which are OSHA, DOT, ANSI, SNELL or NOCSAE approved or comparable standard while on the racecourse.

2. All officials will be off the course except for the starter and their assistant.

3."On the course" is defined to mean any area beyond the pilot/staging area where actual flying takes place.

B. I will not fly my model aircraft in any organized racing event which does not comply with paragraph A above or which allows models over 20 pounds unless that competition event is AMA sanctioned.

C. Distance from the pylon to the nearest spectator (line) will be in accordance with the current Competition Regulations under the RC Pylon Racing section for the specific event pending two or three pylon course layout.

11) RC night flying is limited to low-performance models (less than 100 mph). The models must be equipped with a lighting system that clearly defines the aircraft's position in the air at all times.

HANGAR 9®

HORIZON HOBBY

© 2006 Horizon Hobby, Inc.
4105 Fieldstone Road
Champaign, Illinois 61822
(877) 504-0233
horizonhobby.com