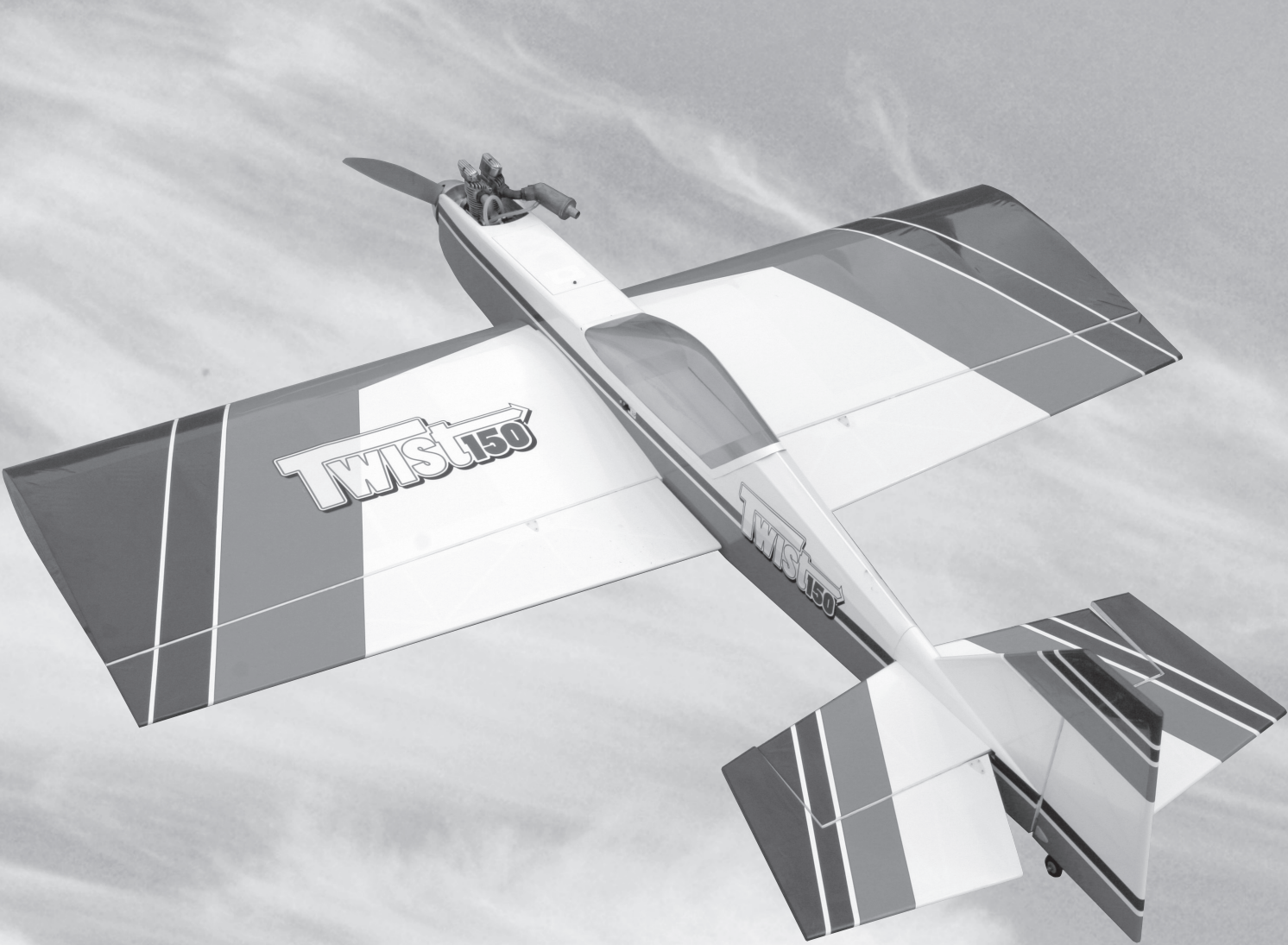




Fly First Class™

Twist 150 ARF

ASSEMBLY MANUAL



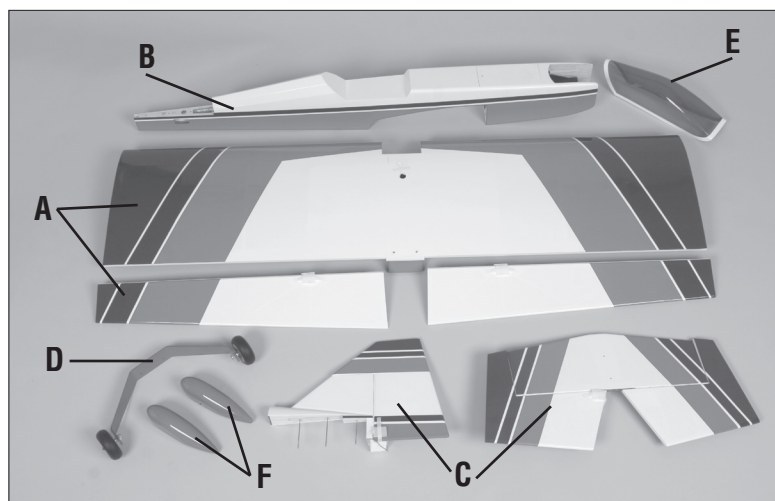
Specifications

Wingspan.....	61 in (1549.5mm)	Length.....	59 in (1498.5mm)
Wing Area	1224 sq in (78.96 sq dm)	Weight.....	8.5–10 lb (3.8kg–4.5kg)
		Engine.....	1.25–1.80 Four-Stroke
		26cc Gasoline

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Contents of Kit



Replacement Parts

A. HAN4526	Wing Set
B. HAN4527	Fuselage
C. HAN4528	Tail Set
D. HAN4529	Landing Gear without Wheels
E. HAN4530	Painted Canopy
F. HAN4534	Wheel Pant Set

Items not shown

HAN4531	Pushrod Set
HAN4532	Decal Set
HAN4533	Tail Wheel Set

UltraCote® Covering Colors

- | | | | |
|-----------------|---------|---------|---------|
| • Midnight Blue | HANU885 | • White | HANU870 |
| • Flame Red | HANU883 | | |

Radio and Power Systems Requirements

- 4-channel radio system (minimum) w/receiver
- ST125MG Servo (JSP20070) (5) or equivalent
- 6" Servo Lead Extension (JRPA095) (2)
- 9" Servo Lead Extension (JRPA097) (2)
- 18" Servo Lead Extension (JRPA099)
- 24" Servo Lead Extension (JRPA102)

Recommended JR® or JR SPORT™ Systems

- XP9303
- XP7202
- DX7
- XP6102
- XS600

Recommended Power Systems

- 1.25–1.80 4-cycle engines
Recommended: Saito™ 1.50–1.80
- 26cc gas engine
Recommended: Evolution® 26GT2
(Requires BIS05518 Sport Muffler)



Saito 1.80 AAC
SAIE180



Spektrum DX7



Evolution 26GT2
EVOE26GT2



JR XP9303



JR XP6102

Field Equipment Required

- 3 1/4" Spinner (TRU3252B or TRU3262B120)
- Fuel
- Metered Glow Driver w/Ni-Cd & Charger (HAN7101)
- 4-Cycle Super Plug (HAN3011)
- Manual Fuel Pump (HAN118)
- Propeller (17 x 6, APC17060 recommended)
- Long Reach Glow Plug Wrench (HAN2510)
- 2-Cycle Sport Plug (HAN3001)
- 2-Cycle Super Plug (HAN3006)

Optional Field Equipment

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

Required Tools and Adhesives

Tools

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

Adhesives

- Thin CA (PAAPT08)
- CA remover/debonder (PAAPT16)
- Canopy glue (PAAPT56)
- 30-minute epoxy (HAN8002)
- Pacer Z-42 Threadlock (PAAPT42)

Warranty Period

Exclusive Warranty- Horizon Hobby, Inc., (Horizon) warrants that the Products purchased (the "Product") will be free from defects in materials and workmanship at the date of purchase by the Purchaser.

Limited Warranty

(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. This warranty covers only those Products purchased from an authorized Horizon dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims. Further, Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(b) Limitations- HORIZON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCT. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

(c) Purchaser Remedy- Horizon's sole obligation hereunder shall be that Horizon will, at its option, (i) repair or (ii) replace, any Product determined by Horizon to be defective. In the event of a defect, these are the Purchaser's exclusive remedies. Horizon 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. 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 Horizon. Return of any goods by Purchaser must be approved in writing by Horizon before shipment.

Damage Limits

HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon 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.

Law: These Terms are governed by Illinois law (without regard to conflict of law principals).

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 directly. This will enable Horizon to better answer your questions and service you in the event that you may need any 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 this 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 is not responsible for merchandise until it arrives and is accepted at our facility**. A Service Repair Request is available at www.horizonhobby.com on the "Support" tab. If you do not have internet access, please include a letter with your complete name, street address, email address and phone number where you can be reached during business days, your RMA number, a list of the included items, method of payment for any non-warranty expenses and a brief summary of the problem. Your original sales receipt must also be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

Warranty Inspection and Repairs

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Provided 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 the repair will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon 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. **Please note: non-warranty repair is only available on electronics and model engines.**

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822

All other Products requiring warranty inspection or repair should be shipped to the following address:

Horizon Product Support
4105 Fieldstone Road
Champaign, Illinois 61822

Please call 877-504-0233 with any questions or concerns regarding this product or warranty.

Safety, Precautions, and Warnings

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 advisable 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 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 150, 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 Installation

Required Parts

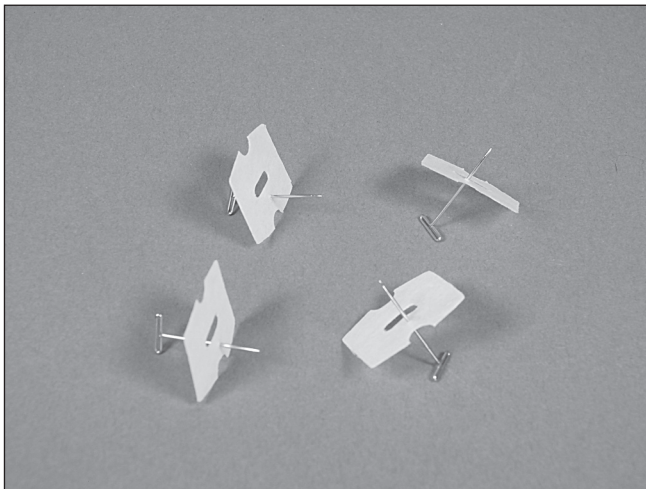
- Wing panel w/ailerons
- Servo w/hardware (2)
- Servo extension, 9" (228mm) (2)
- Pre-assembled 3 1/2" (89mm) aileron linkage (2)

Required Tools and Adhesives

- Drill
- Thin CA
- Drill bit: 1/16" (1.5mm), 3/32" (2.5mm)
- T-pins
- Phillips screwdriver
- Long servo arm
- Rotary tool
- CA hinge (8)

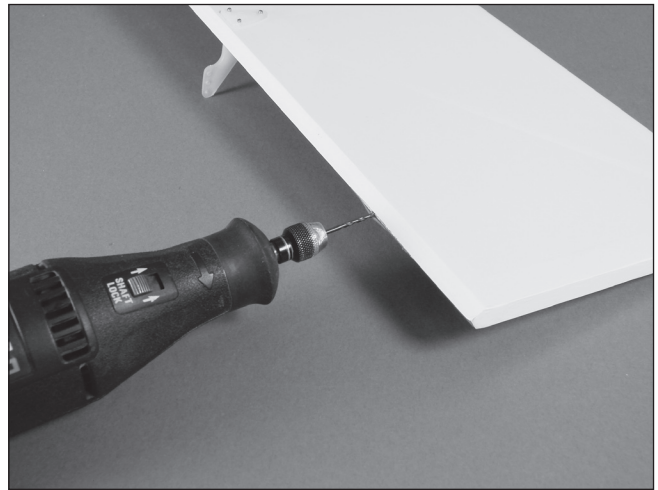
□ □ Step 1

Locate four CA hinges. Place a T-pin in the center of the hinges.



□ □ Step 2

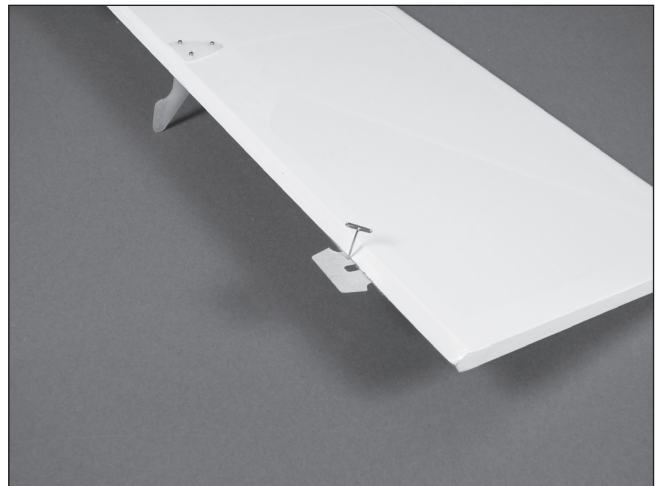
Use a 1/16" (1.5mm) drill bit to drill a hole in the center of each hinge location in both the wing and aileron. This creates a tunnel that the CA can pass through allowing the CA to penetrate further into the hinge.



Note: Using a rotary tool and 1/16" (1.5mm) drill bit will make the perfect hole as it removes the excess wood fibers from the hole.

□ □ Step 3

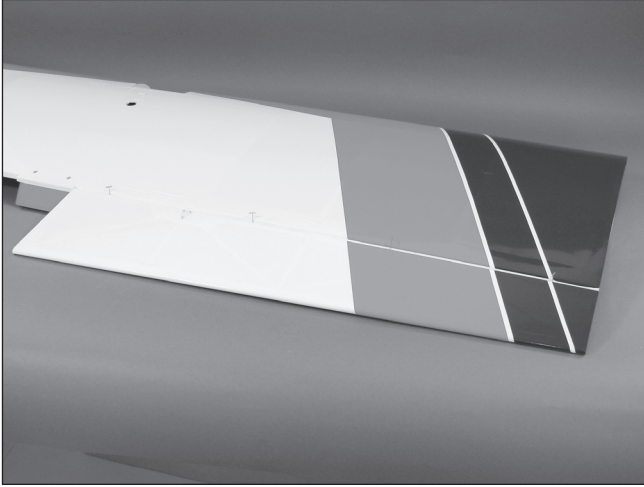
Place the hinges in the precut slots in the aileron (or wing if you prefer). Each T-pin will rest against the edge when installed correctly.



Section 1: Aileron Installation

□ □ Step 4

Slide the aileron and wing together. The gap between the aileron and wing should be approximately 1/64" (.4mm). Align the end of the aileron to the wing. Also check that the aileron can move freely and not bind at the wing root.



Note: Do not use CA accelerator during the hinging process. The CA must be allowed to soak into the hinge to provide the best bond. Using accelerator will not provide enough time for this process.

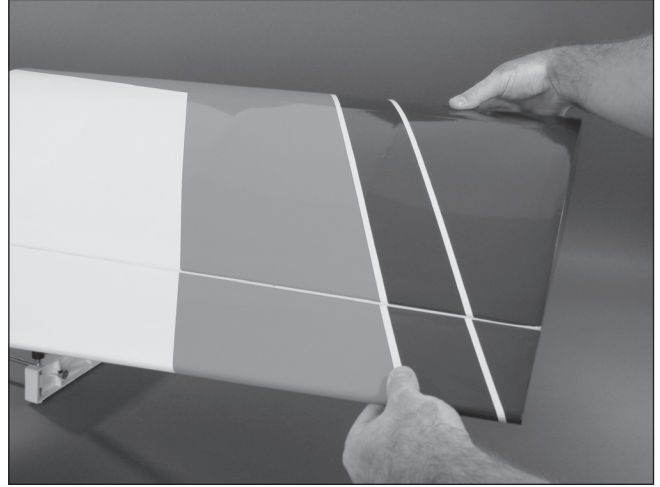
□ □ Step 5

Remove the T-pins from the hinges. Flex the aileron and apply Thin CA to each hinge. Make sure the hinge is fully saturated with CA. Use a paper towel and CA remover/debonder to clean up any excess CA from the wing and/or aileron. Make sure to apply CA to both the top and bottom of the hinge.



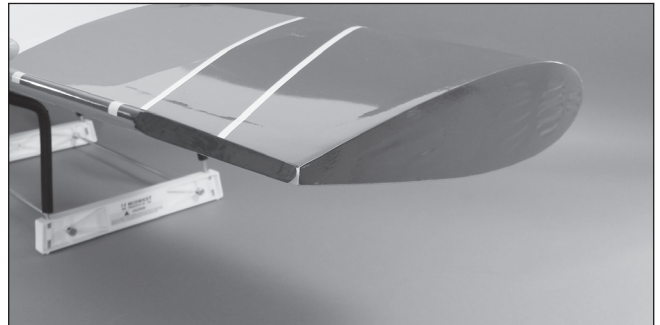
□ □ Step 6

Firmly grasp the wing and aileron and gently pull on the aileron to ensure the hinges are secure and cannot be pulled apart. Use caution when gripping the wing and aileron to avoid crushing the structure.



□ □ Step 7

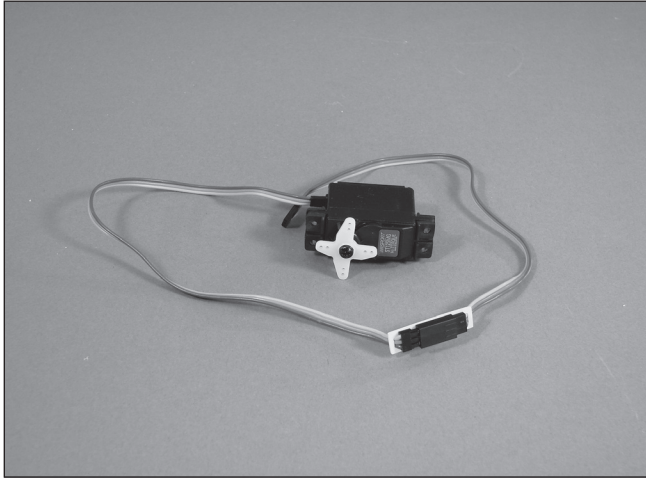
Flex each aileron up and down a number of times to break in the hinges.



Section 1: Aileron Installation

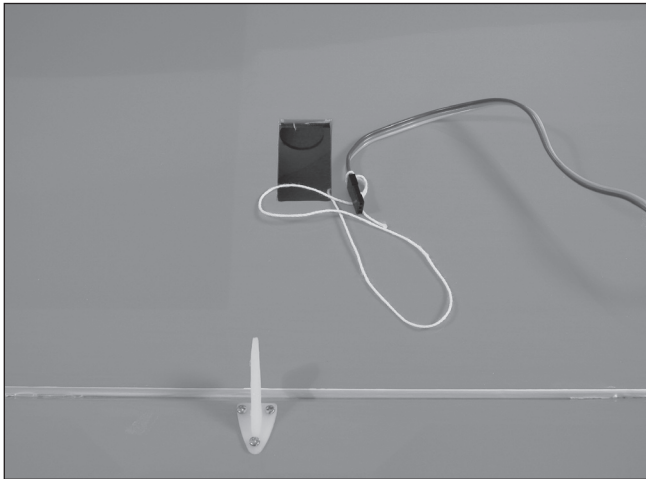
□ □ Step 8

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.



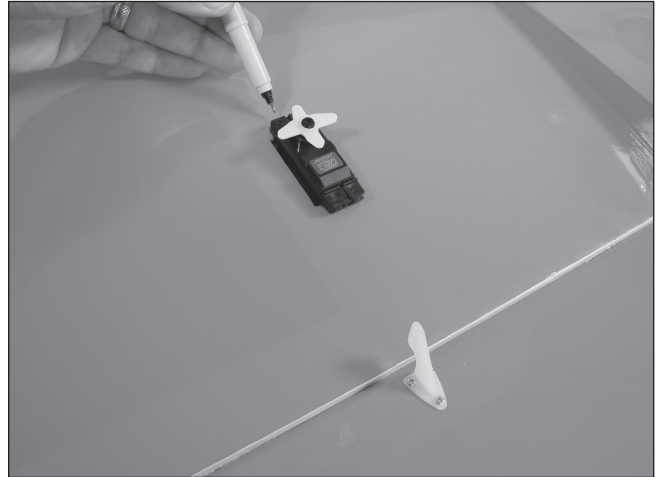
□ □ Step 9

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.



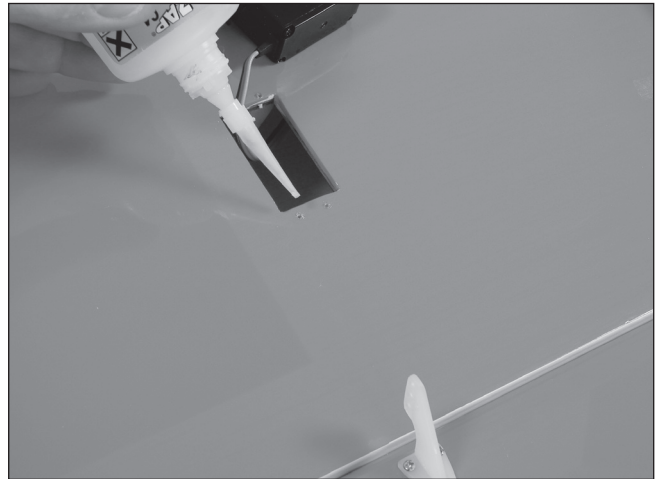
□ □ Step 10

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



□ □ Step 11

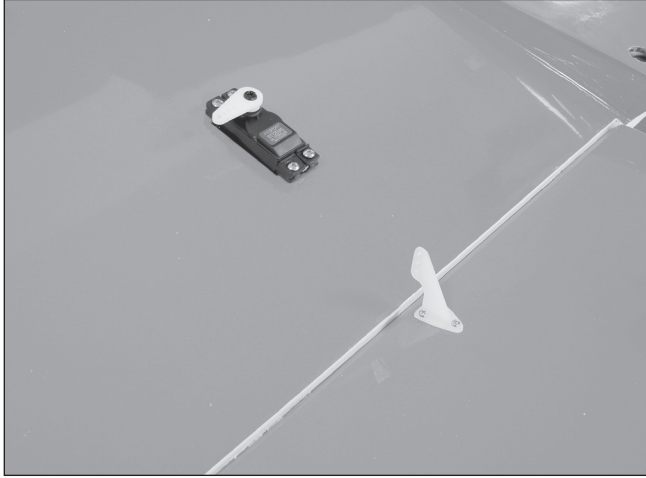
Remove the servo and drill the locations for the servo mounting screws using a 1/16" (1.5mm) drill bit. Apply a few drops of thin CA to each hole to harden the wood, which will help in preventing the screws from damaging the wood.



Section 1: Aileron Installation

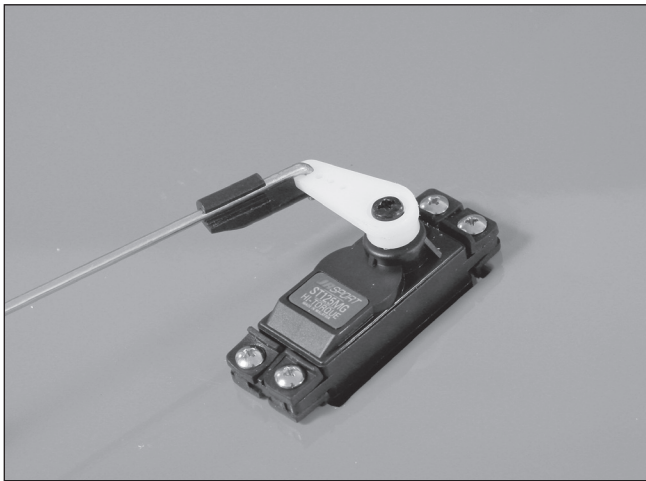
□ □ Step 12

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.



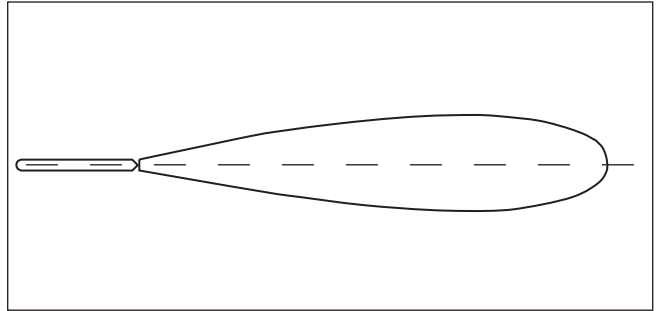
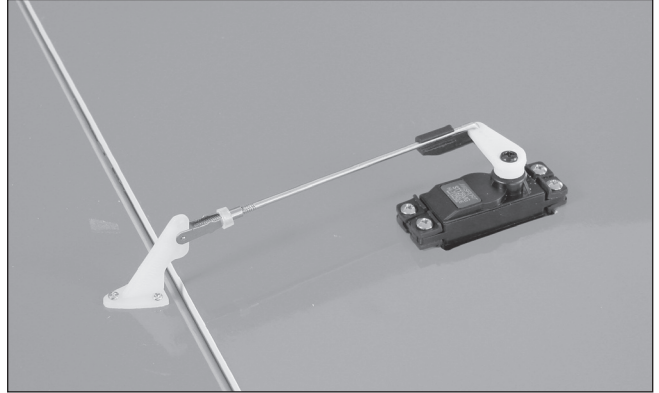
□ □ Step 13

Enlarge the outer hole of the servo arm using a 3/32" (2.5mm) 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.



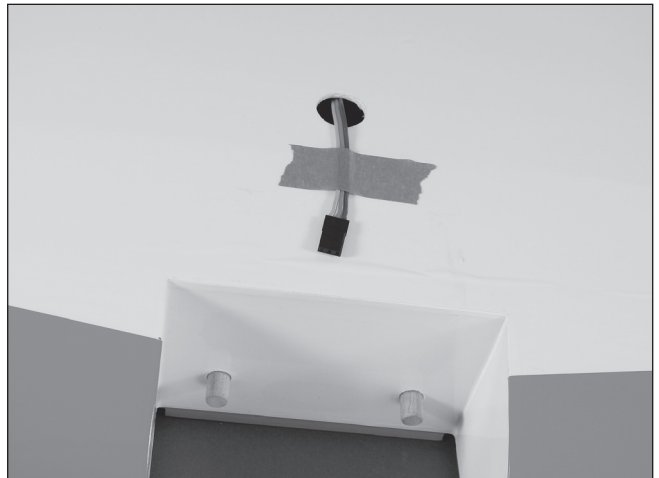
□ □ Step 14

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 15

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



□ Step 16

Repeat Steps 1 through 15 for the remaining aileron servo.

Section 2: Landing Gear and Tail Installation

Required Parts

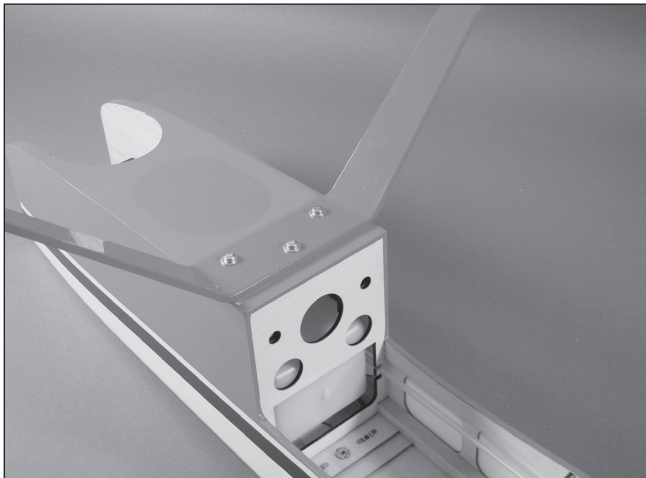
- Landing gear w/wheels
- 1" (25mm) tail wheel
- Stabilizer assembly
- #4 washer (7)
- 5/64" wheel collar
- 4-40 x 1/2" socket head screw (4)
- 8-32 x 3/4" machine screw (3)
- Pre-assembled 5 1/8" (134mm) rudder linkage
- Pre-assembled 4 7/8" (124mm) elevator linkage
- Fuselage
- Rudder assembly
- 4-40 locknut (3)
- #8 washer (3)
- 4-40 setscrew

Required Tools and Adhesives

- Servo w/hardware (2)
- Adjustable wrench
- 18" (458mm) servo extension
- 24" (610mm) servo extension
- Long servo arm (2)
- Threadlock

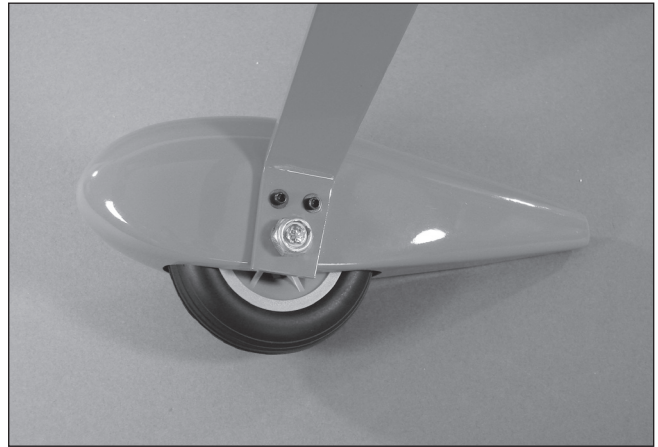
□ Step 1

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.



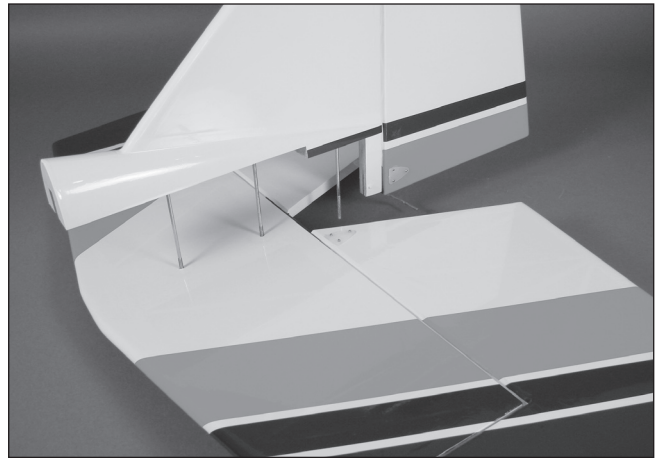
□ Step 2

Attach the wheel pants using four 4-40 x 1/2" socket head screws and four #4 washers.



□ Step 3

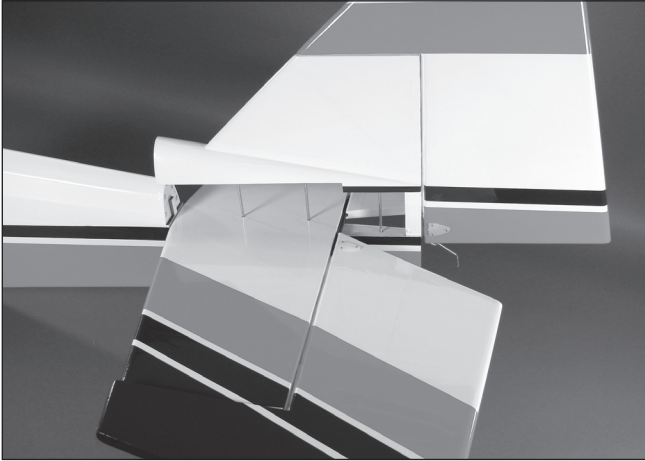
Slide the threaded rods from the rudder assembly into the holes in the stabilizer. The two forward rods go through the stabilizer as shown.



Section 2: Landing Gear and Tail Installation

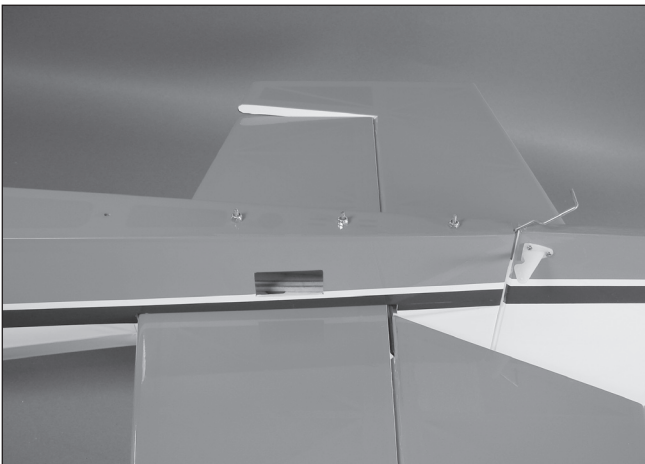
□ Step 4

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.



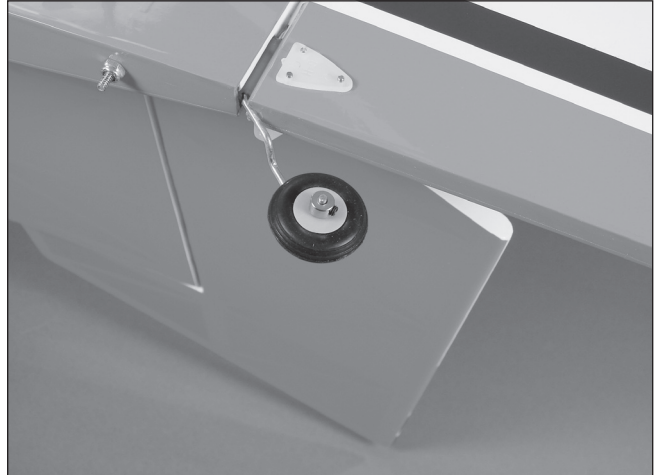
□ Step 5

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.



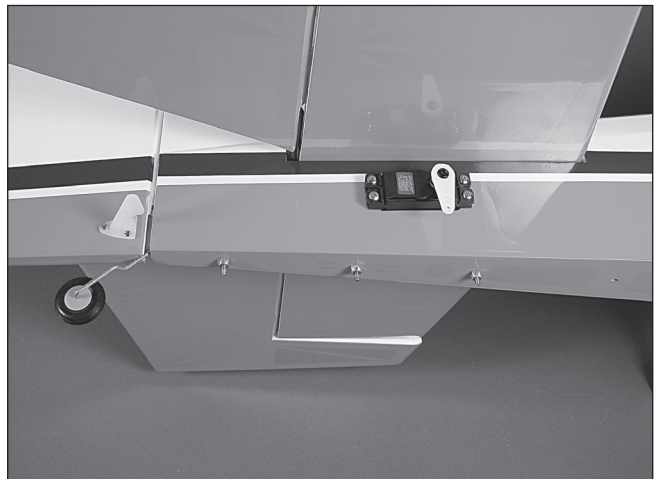
□ Step 6

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 7

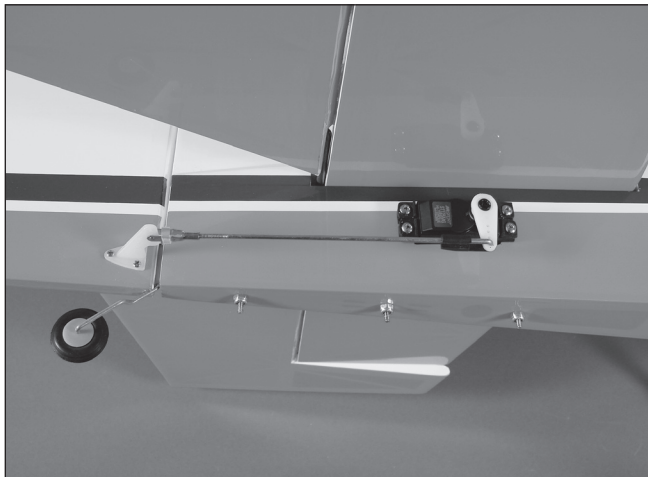
Attach a 24" (610mm) servo extension to the rudder servo. Center the servo using the radio and install a long servo arm onto the servo. Use the photo to determine which arm to trim off, as it will hit the elevator if left in place. Mount the rudder servo into the fuselage using the same procedure as the aileron servo.



Section 2: Landing Gear and Tail Installation

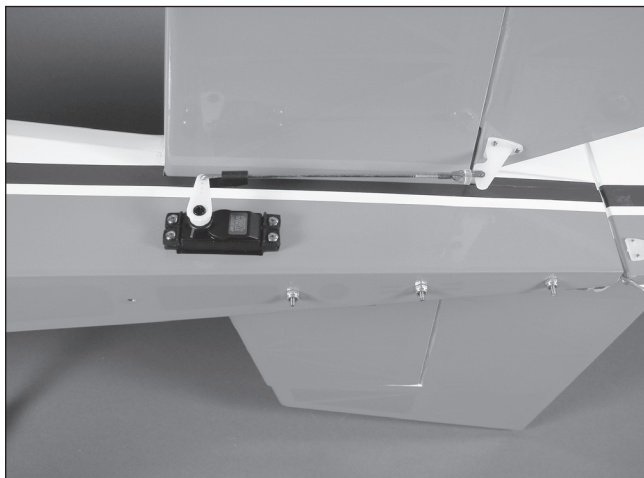
☐ ☐ Step 8

Install the pre-assembled $5\frac{1}{8}$ " (134mm) rudder linkage. With the radio on, adjust the length of the linkage so the rudder is centered.



☐ Step 9

Repeat Steps 7 and 8 to install the elevator servo and linkage. Use a 18" (458mm) servo extension and the $4\frac{7}{8}$ " (124mm) elevator linkage when installing the elevator servo.



Section 3A: Four-Stroke Engine Installation

Required Parts

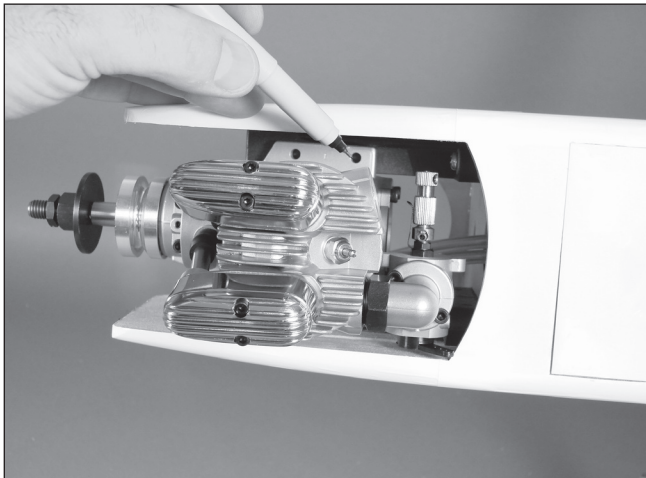
- #8 washer (4)
- Rubber band (2)
- Pushrod connector
- 8-32 locknut (4)
- 8-32 x 1 1/4" screw (4)
- 20" (508mm) throttle pushrod
- 3 1/2" (83mm) spinner w/hardware
- Pushrod connector backplate
- 3mm x 5mm machine screw

Required Tools and Adhesives

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

□ Step 1

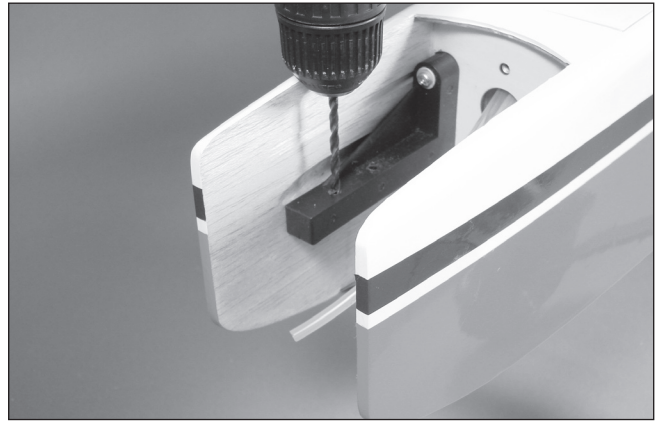
Position the engine on the engine mount so the drive washer is roughly 1/8" (3mm) forward of the sides of the fuselage. Mark the location of the engine mounting bolts using a felt-tipped pen.



Note: The engine must be far enough forward so when the propeller and spinner are installed, they don't bind on the front of the fuselage. A quick check is to slip the spinner backplate on and check for clearance.

□ Step 2

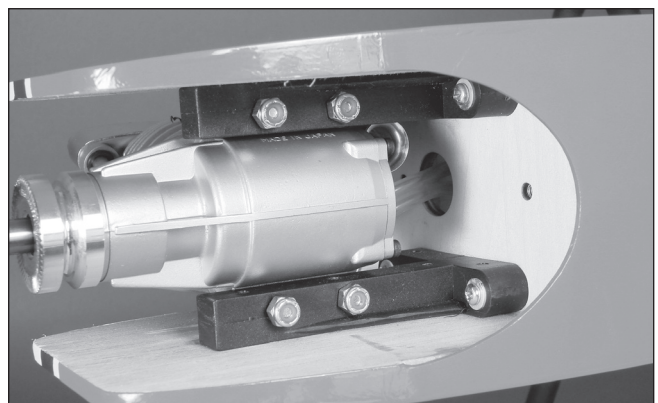
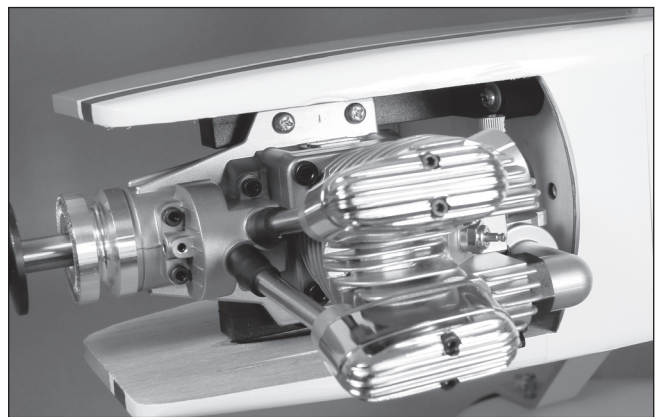
Use a 5/32" (4mm) drill bit to drill the holes in the engine mount.



Hint: Remove the mounts and use a drill press to get the holes in the mount perpendicular to the mount.

□ Step 3

Mount the engine to the mount using four 8-32 x 1 1/4" screws, four #8 washers and four 8-32 locknuts.



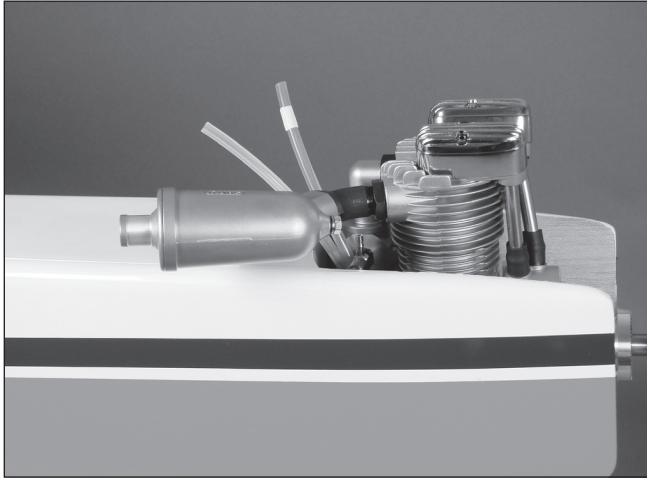
Section 3A: Four-Stroke Engine Installation

□ Step 4

Slide the 20" (508mm) throttle pushrod into the pushrod tube and attach the clevis to the carburetor arm.

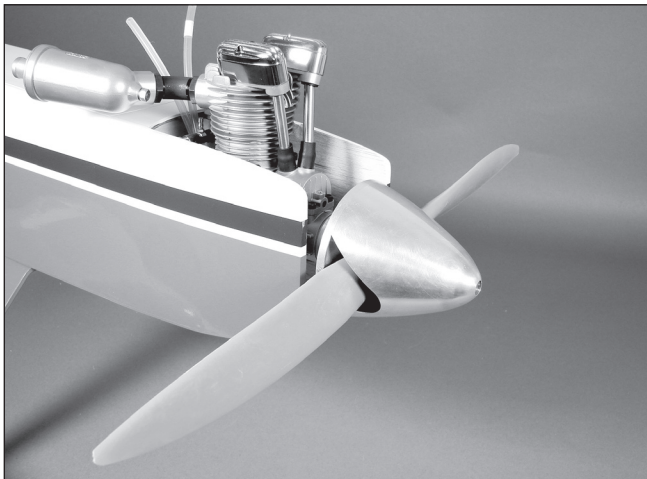
□ Step 5

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



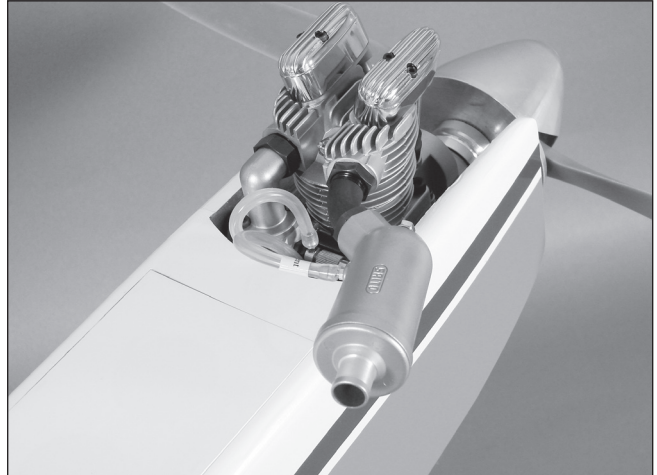
□ Step 6

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



□ Step 7

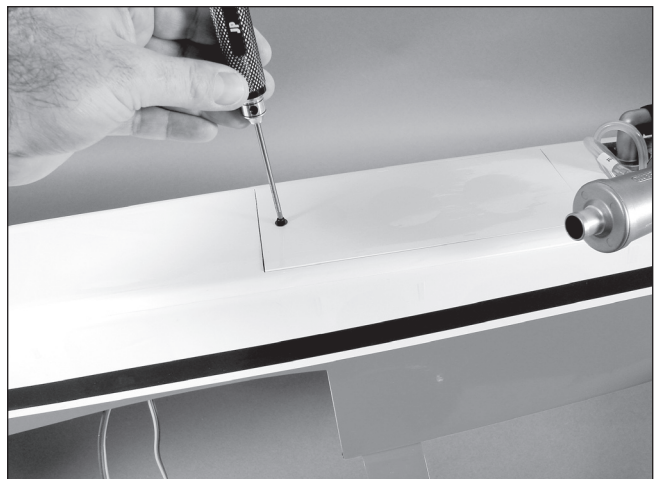
Attach the lines from the fuel tank to the engine. The line marked "vent" will attach to the muffler, and the remaining line connects to the carburetor.



Note: Plan on installing a needle valve extension. It will be necessary to use a rotary tool to provide clearance between the extension and side of the fuselage.

□ Step 8

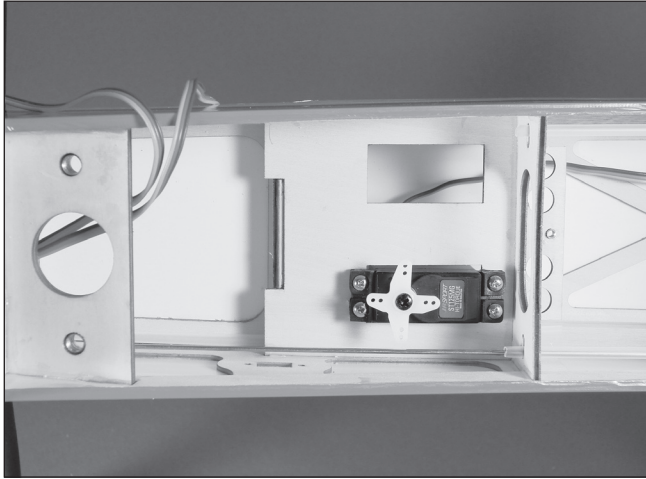
Place the fuselage hatch into position and secure it using the 4-40 x 1/2" socket head screw.



Section 3A: Four-Stroke Engine Installation

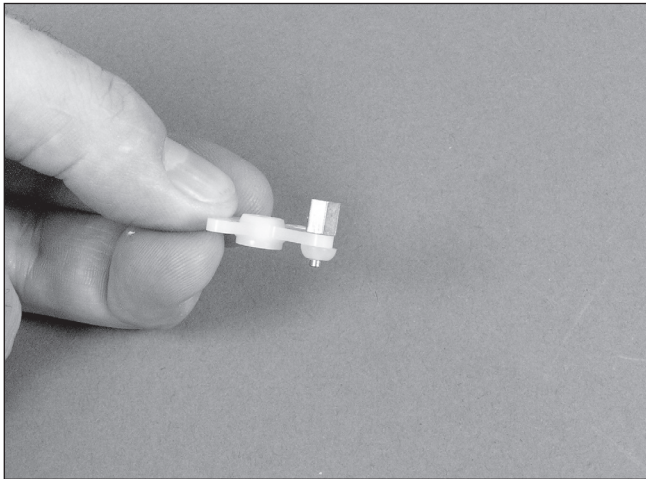
□ Step 9

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



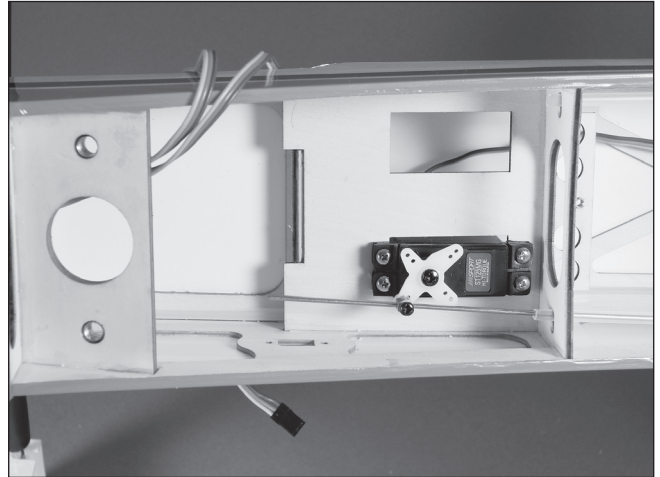
□ Step 10

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 11

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 12

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: Gasoline Engine Installation

Required Parts

- #8 washer (4)
- Rubber band (2)
- Pushrod connector
- 8-32 locknut (4)
- 8-32 x 1 1/4" screw (4)
- 20" (508mm) throttle pushrod
- 3 1/4" (83mm) spinner w/hardware
- Pushrod connector backplate
- 3mm x 5mm machine screw

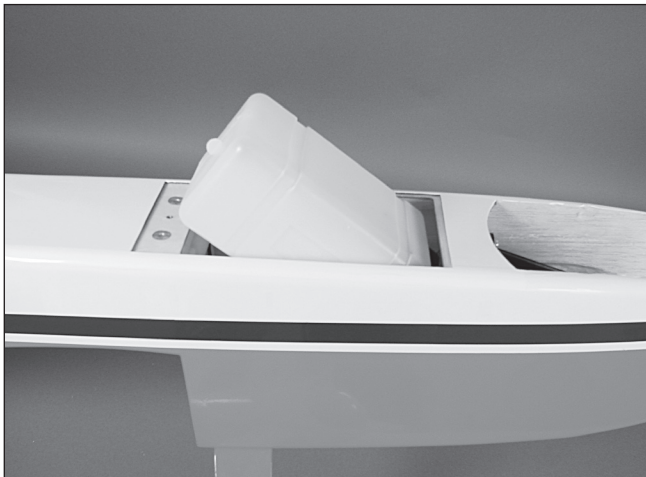
Required Tools and Adhesives

- | | |
|---------------------------------------|------------------------|
| • Servo w/hardware | • Ruler |
| • Drill | • Phillips screwdriver |
| • Hobby knife | • Rotary tool |
| • Sanding drum | |
| • Drill bit: 5/64" (2mm), 5/32" (4mm) | |

Note: Installing the Evolution® 26GT will require some minor modifications to your Twist™ 150.

□ Step 1

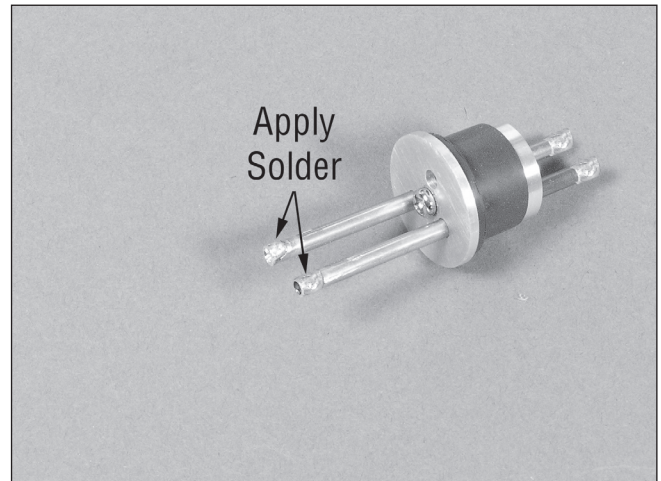
Remove the hatch from the fuselage. Slide the rubber band back holding the fuel tank in position and remove the fuel tank.



Note: You will need to install gas compatible fuel lines and prepare the metal fuel tubing as follows.

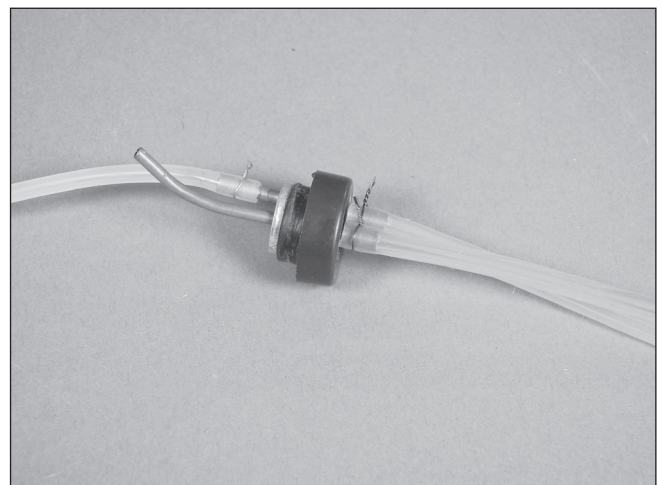
□ Step 2

Remove the stopper from the fuel tank using a Phillips screwdriver. Remove the fuel lines from the stopper and set them aside. Prepare the tubing by placing a drop of solder on the ends of the brass tubing as shown. This will keep the fuel line from slipping off the tube when combined with the following steps.



□ Step 3

Slide gas compatible fuel lines back onto the brass tubes. Use fine wire to secure the fuel lines. The wire is placed behind the solder applied in the previous step to keep the tubes in place.



Section 3B: Gasoline Engine Installation

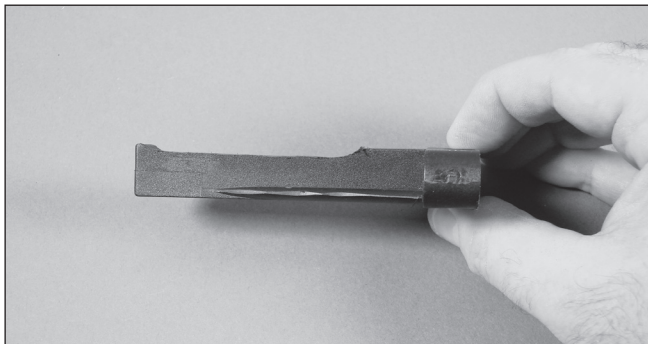
□ Step 4

Carefully insert the stopper assembly into the fuel tank. Note the position of the vent tube; it must be up at the top portion of the fuel tank to function properly. Tighten the M3 x 20 screw carefully—do not over-tighten.



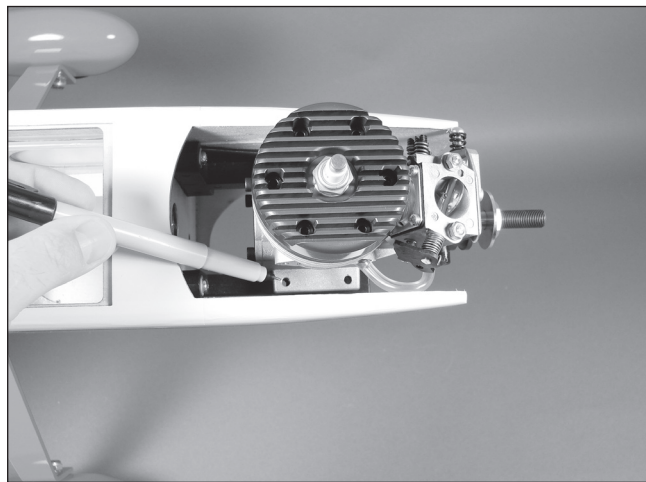
□ Step 5

Use a rotary tool to remove material from the inside of the engine mount to fit your particular engine.



□ Step 6

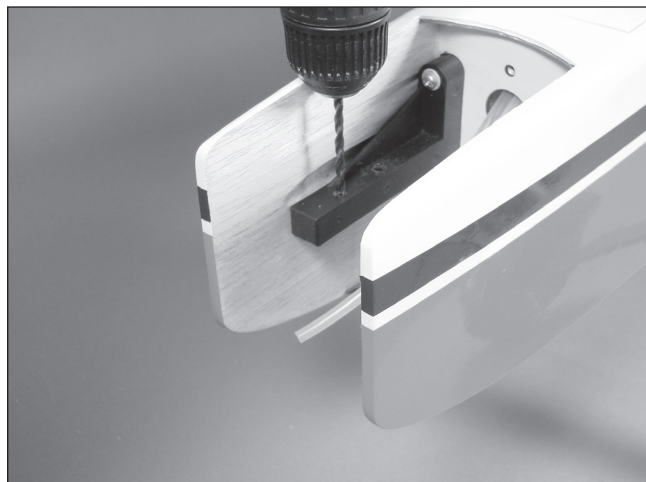
Position the engine on the engine mount so the drive washer is roughly 1/8" (3mm) forward of the sides of the fuselage. Mark the location of the engine mounting bolts using a felt-tipped pen.



Note: The engine must be far enough forward so when the propeller and spinner are installed, they don't bind on the front of the fuselage. A quick check is to slip the spinner backplate on and check for clearance.

□ Step 7

Use a 5/32" (4mm) drill bit to drill the holes in the engine mount.

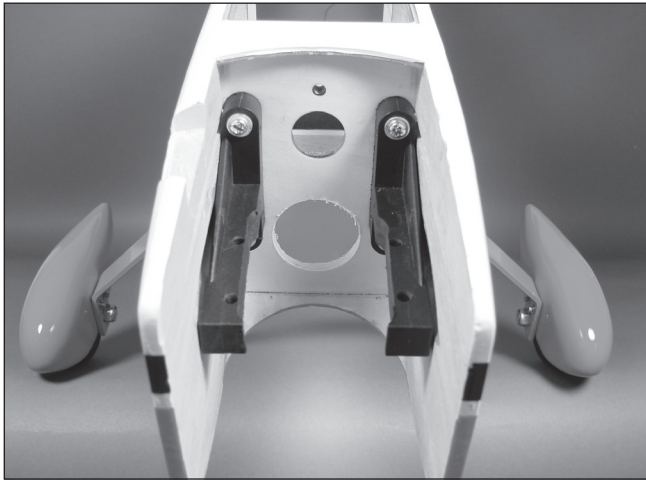


Hint: Remove the mounts and use a drill press to get the holes in the mount perpendicular to the mount.

Section 3B: Gasoline Engine Installation

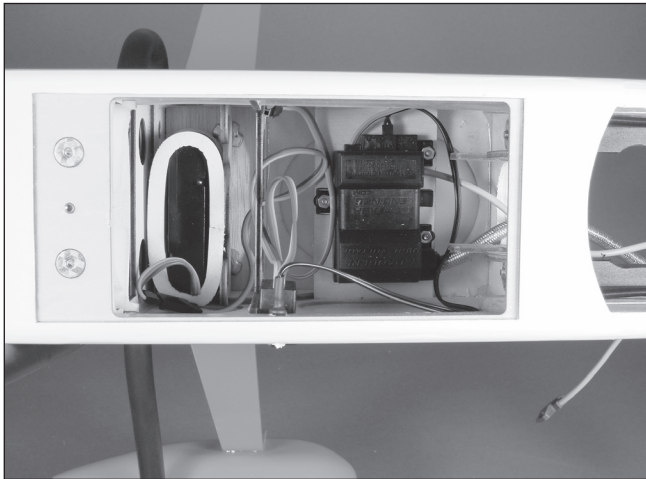
□ Step 8

Use a 1" hole saw or rotary tool to make a hole in the firewall that will be below the fuel tank.



□ Step 9

Use plywood to create a shelf inside the fuselage to mount the ignition and battery for your engine. Make sure the ignition is secure to the plate, and the plate is secure inside the fuselage. Route any necessary connections through the 1" hole made in the firewall in Step 7. Install a Switch Harness (JRPA004) in the fuselage opposite the side the radio switch will be mounted to.



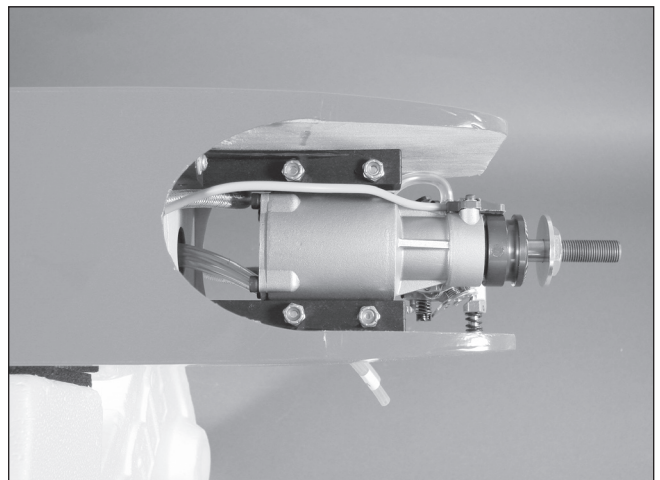
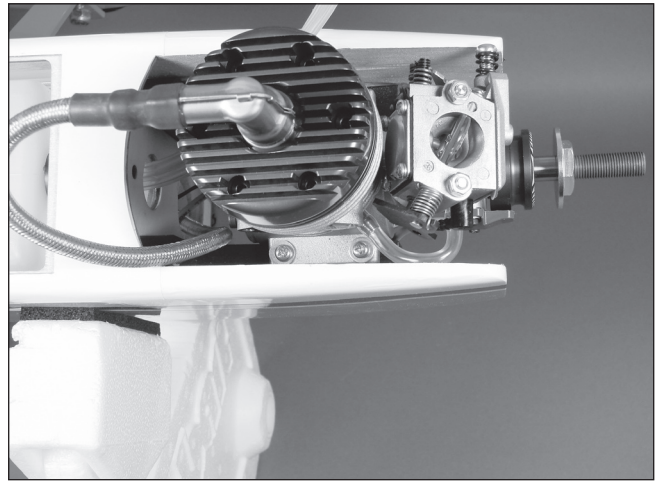
Note: Make sure your ignition system with battery will not interfere with the fuel tank. Place the battery back in the fuselage if necessary.

□ Step 10

Install the fuel tank back inside the fuselage.

□ Step 11

Attach any necessary items to the engine using the instructions provided with the engine. Mount the engine to the mount using four 8-32 x 1 1/4" screws, four #8 washers and four 8-32 locknuts.



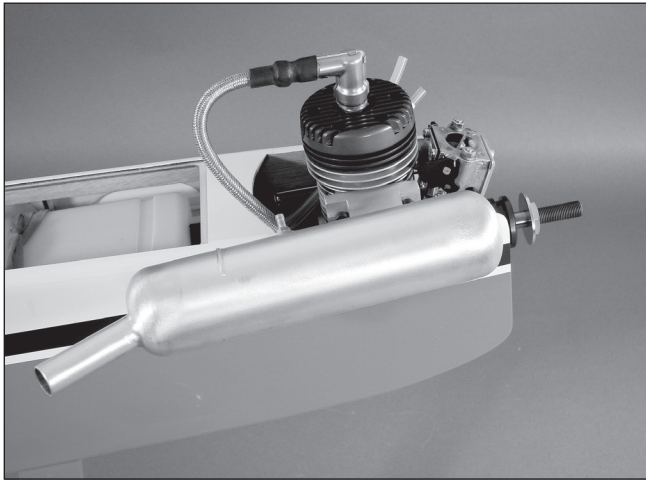
□ Step 12

Slide the 20" (508mm) throttle pushrod into the pushrod tube and attach the clevis to the carburetor arm.

Section 3B: Gasoline Engine Installation

□ Step 13

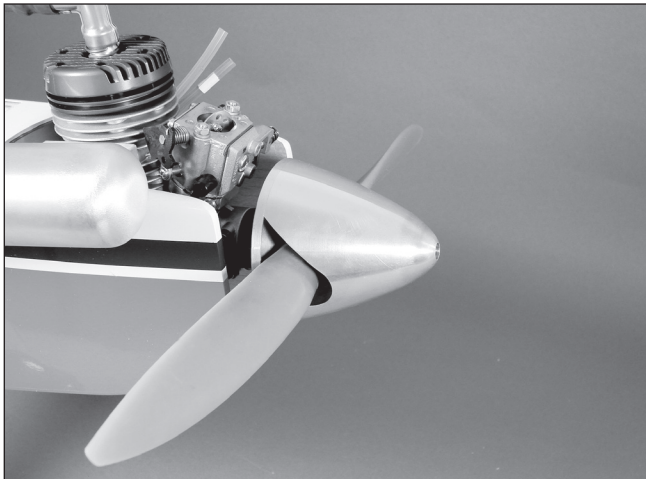
Install the muffler onto your engine using the instructions provided with the engine as a guide.



Note: You will need to use a rotary tool to remove some material from the fuselage side to provide clearance for the muffler.

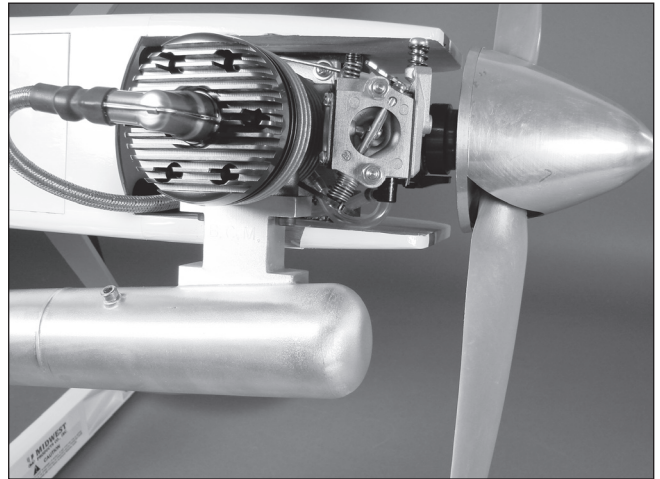
□ Step 14

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



□ Step 15

Attach the line from the fuel tank to the engine. Route the vent line from the fuel tank behind the engine and to the bottom of the fuselage. Remove the fuel fitting from the muffler and replace it with an 8-32 x 1/4" screw to seal the hole.



□ Step 16

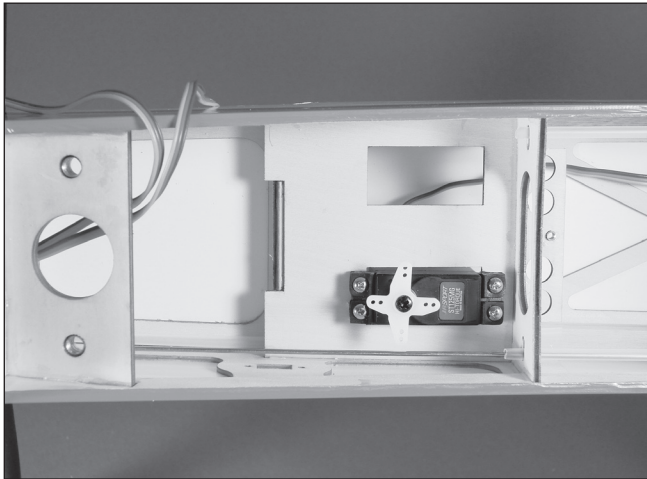
Place the fuselage hatch into position and secure it using the 4-40 x 1/2" socket head screw.



Section 3B: Gasoline Engine Installation

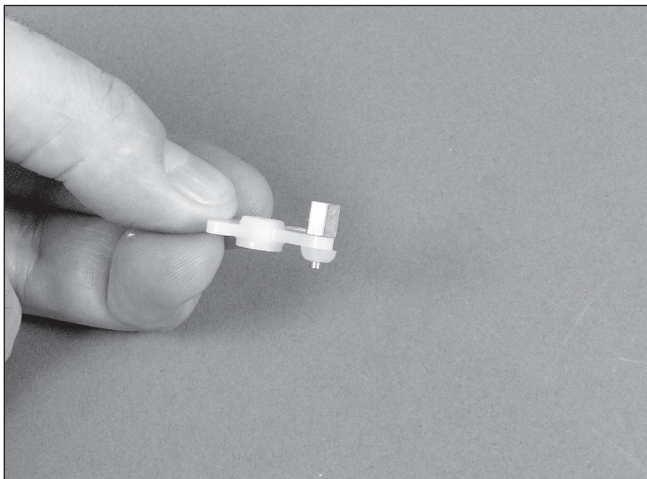
□ Step 16

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



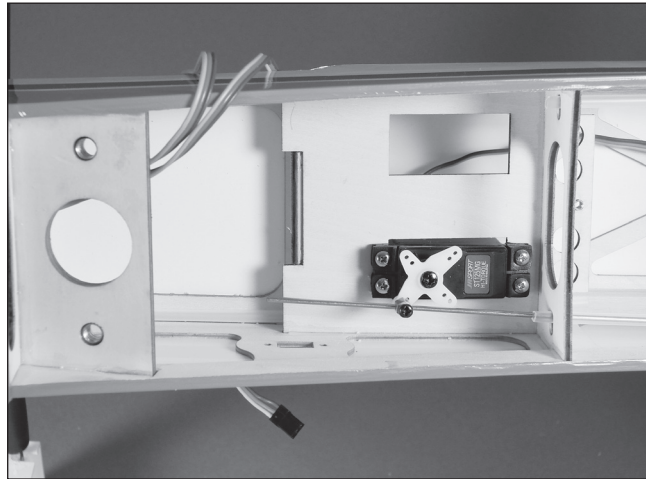
□ Step 17

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 18

Use the radio to move the throttle to the mid-point setting using the stick and trim. Move the pushrod so the carburetor is at mid-point. This installation method will provide for a more linear throttle response. Secure the pushrod wire using a 3mm x 5mm machine screw.



□ Step 19

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 4: Final Assembly

Required Parts

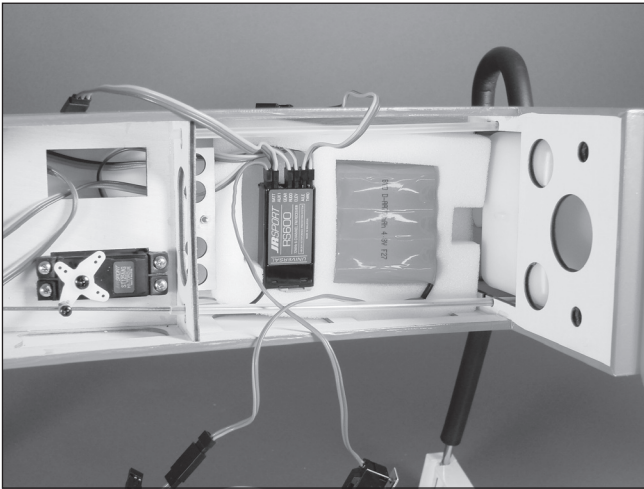
- Fuselage
- Wing
- 1/4-20 x 1 1/2" nylon bolt (2)
- Canopy

Required Tools and Adhesives

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

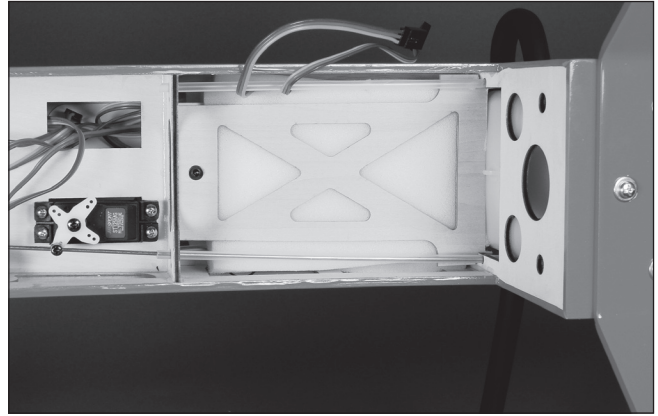
□ Step 1

Place a flat piece of foam into the fuselage, followed by the shaped radio foam. Plug the servos and extensions into their proper location in the receiver. Route the receiver antenna wire through the tube on the right-hand side of the fuselage to the tail. Place the receiver and receiver battery into the foam.



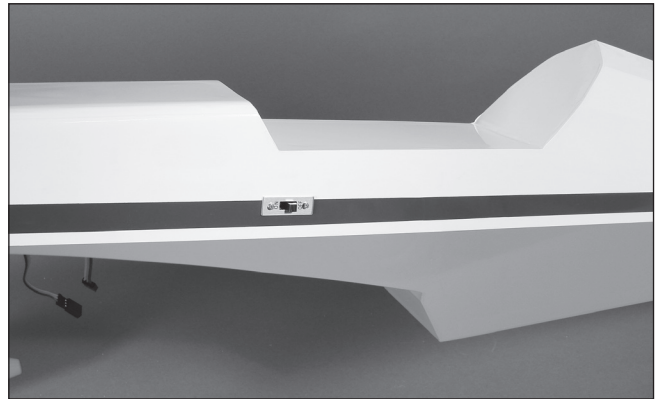
□ Step 2

Place the remaining flat foam over the receiver and receiver battery. Slide the radio plate into position and secure it using a 4-40 X 1/2" socket head screw and #4 washer.



□ Step 3

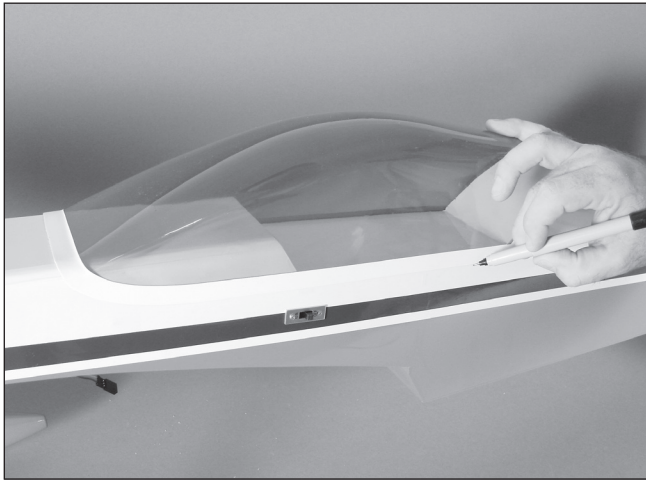
Remove the covering from the opening on the left side of the fuselage for the switch harness. Install the harness using the hardware provided with the harness.



Section 4: Final Assembly

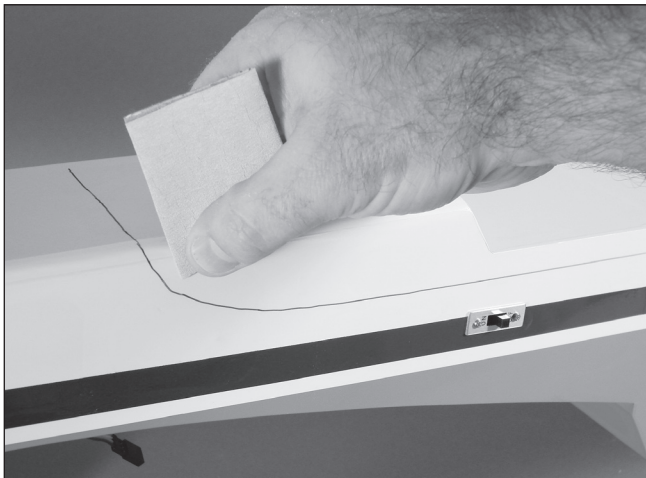
☐ Step 5

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



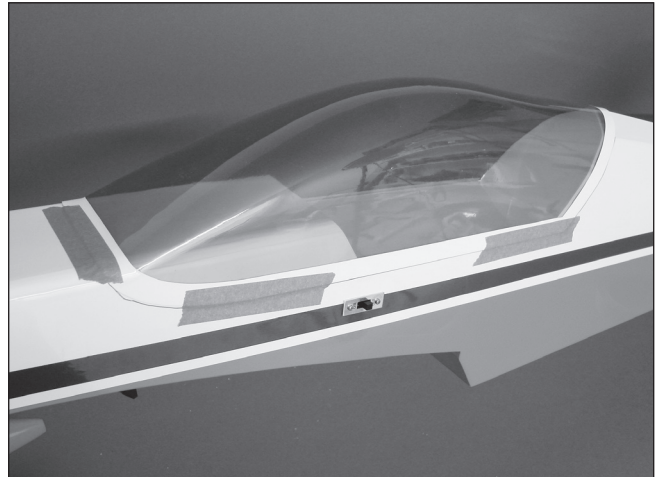
☐ Step 6

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 $1\frac{3}{8}"$ (35mm) (13°) up/down
Aileron High Rate 3" (76mm) (30°) up/down

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

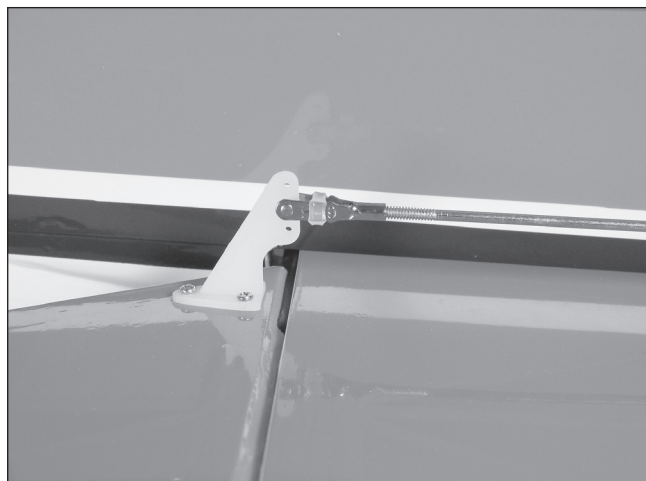
Elevator Low Rate $1\frac{1}{2}"$ (38mm) (15°) up/down
Elevator High Rate $3\frac{1}{2}"$ (89mm) (40°) up/down

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

Rudder Low Rate $3\frac{1}{2}"$ (89mm) (30°) right/left
Rudder High Rate 5" (127mm) (45°) 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.

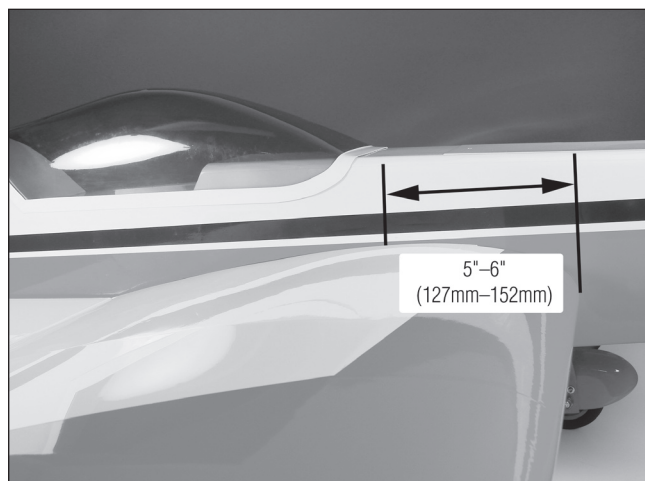


Recommended Center of Gravity (CG)

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 150 is 5"—6" (127mm—152mm) 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

Before each flying session, be sure to range check your radio. See your radio manual for the recommended range and instructions for your radio system. Each radio manufacturer specifies different procedures for their radio systems. If using a gasoline engine, check the range first with the engine not running and note the distance. Next,

start the engine. With the model securely anchored, check the range again. The range test should not be significantly affected. If it is, don't attempt to fly! Have your radio equipment checked out by the manufacturer.

Maintaining Your Twist 150 ARF

The following is a check list that you should follow every time you have completed a flying session with your Twist™ 150. 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 150 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.

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, 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. Being 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.

[illegible]

2007 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.)

2007 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.



Fly First Class™



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