HANGAR 9 ®

Fly First Class ™

Sundowner
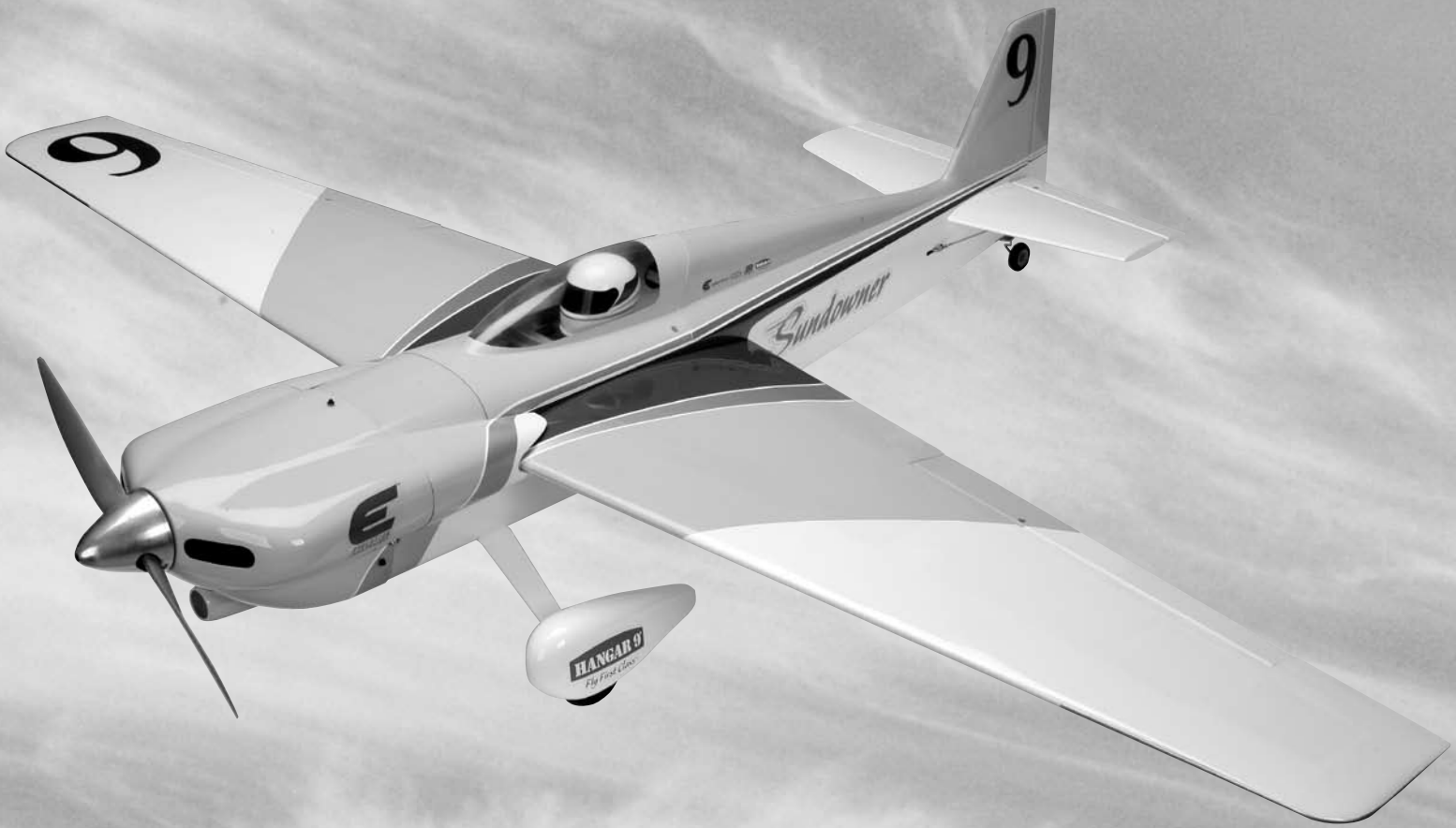
Specifications

Wingspan	80.5 in (2045mm)	Weight	12–14 lb (5.44kg–6.35kg)
Wing Area	933 sq in (60.19 sq dm)	Engine	1.20–1.80 Four-Stroke
Length	60.6 in (1539mm)		26–35cc Gasoline
		Motor	E-flite Power 160

Table of Contents

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.

Required Tools and Adhesives

Tools
- Rotary tool (dremel)
- Pliers
- Solder
- File
- Hex wrench: 3/32-inch• Square
- Phillips screwdriver
- Drill
- Ruler
- Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm), 3/32-inch or # 43 bit (2.5mm), 7/64" bit (3mm), 5/32-inch (4mm), 11/64-inch (4.5mm)

- Sanding drum 1/4-inch
- T-pins
- Solder gun
- 4/40 tap
- Hobby knife
- Adjustable wrench
- Felt-tipped pen

Adhesives
- Thin CA (PAAPT08)
- CA Remover/Debonder (PAAPT16)

- 30-minute Epoxy (HAN8002)
- Pacer Z-42 Threadlock (PAAPT42)

UltraCote Covering Colors

- White   HANU870
- Cub Yellow   HANU884

- Silver   HANU881
- Pearl Blue   HANU845

Before Starting Assembly

Before beginning the assembly of the Sundowner, 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

Radio and Power Systems Requirements

- 4-channel radio system (minimum) w/receiver
- 6-inch Servo Lead Extension (JRPA095) (3)
- 18-inch Servo Lead Extension (JRPA099) (3)

- ST125MG Servo (JSP20070) (5) or equivalent
- 9-inch Servo Lead Extension (JRPA097) (2)

Recommended JR® or JR SPORT™ Systems

- XP9303
- DX7
- XS600

- XP7202
- XP6102

**E-Flite Power 160
EFLM4160A**

Recommended Setup–Gas/Glow

- Evolution 26GT2 Gas Engine (EVOE26GT2), OR
- Saito 180 AAC with Muffler (SAIE180 or SAIE180GK)
- Muffler Right Angle Adapter (Saito only) (SAI120S140)
- 14x12 – 16x8 Propeller
- $3^1/_4$-inch TruTurn Spinner (TRU3252)
- 4-Channel Radio System
- 6 JR Hi-Torque Servos (JRPS821 or JSP20071)

**Saito 1.80 Golden Knight AAC
SAIE180GK**

**Evolution 26GT2
EVOE26GT2**

Recommended Setup–Electric

- E-flite Power 160 BL Outrunner Motor (EFLM4160A)
- Castle Creations 110A ESC (CSEPHX110HV)
- 2 Thunder Power 4S or 5S Li-Po Battery Packs (THP38504SX or THP38505SX)
- 17x12E APC Propeller (APC17012E)
- $3^1/_4$-inch TruTurn Spinner (TRU3252)
- 4-Channel Radio System
- 5 JR Hi-Torque Servos (JRPS821 or JSP20071)

Spektrum DX7

JR XP9303

FS One

With FS One™ you get more than photorealistic fields, gorgeous skies and realistic looking aircraft. You get incredibly advanced aerodynamic modeling that simulates every possible aspect of real-world flight.

JR XP6102

Instructions for Disposal of WEEE by Users in the European Union

HANS2000

This product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

Warranty Period

Exclusive Warranty- Horizon Hobby, Inc., (Horizon) warranties 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.

Contents of Kit

Replacement Parts

A. HAN4501   Left Wing Panel w/Aileron
B. HAN4502   Right Wing Panel w/Aileron
C. HAN4503   Fuselage
D. HAN4504   Stabilizer Set w/Elevators
E. HAN4505   Rudder
F. HAN4506   Landing Gear w/o Wheels
G. HAN4507   Canopy Hatch
H. HAN4508   Wheel Pant Set
I. HAN4509   Cowl
J. HAN4510   Anodized Wing Tube
K. HAN4511   Aluminum Stabilizer Tube Set
L. HAN4512   Steel Stabilizer Tube Set

Items not shown

HAN4514   Decal Set
HAN4515   Tail Wheel Set
HAN4516   Pushrod Set
HAN4513   Fiberglass Pilot
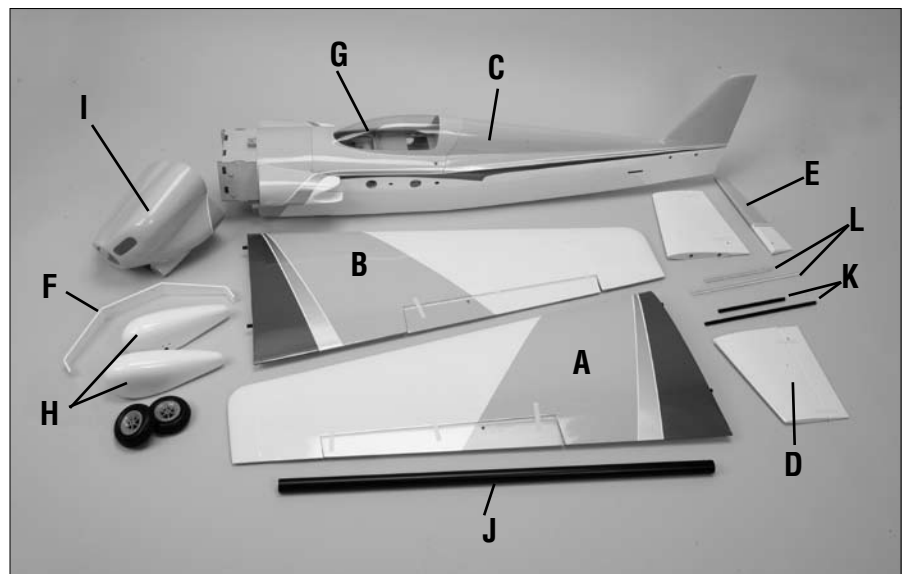
Landing Gear Installation

Required Parts

- Fuselage
- $3\frac{1}{4}$-inch wheel (2)
- 2-inch axles w/lock nuts
- 4-40 x 1/2-inch socket head screw (4)
- 8-32 x 3/4-inch machine screw (4)
- 3mm x 4mm machine screw (4)
- Wheel pant (left and right)
- 5/32-inch wheel collar (4)
- Landing gear
- #4 washer (4)
- #8 washer (8)

Required Tools and Adhesives

- Adjustable wrench
- Hex wrench: 3/32-inch
- Rotary tool w/sanding drum or file
- Phillips screwdriver
- Threadlock

☐ Step 1

Remove the two 4-40 socket head bolts that secure the canopy hatch to the fuselage. Remove the canopy hatch from the fuselage and set it aside in a safe location.

☐ Step 2

Secure the axles to the landing gear using the provided nuts and an adjustable wrench.
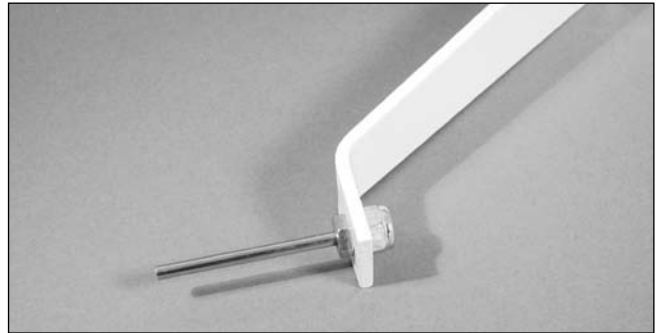
☐ Step 3

Secure the landing gear to the bottom of the fuselage using four 8-32 machine screws, four lock nuts and eight #8 washers. The lock nuts will be inside the fuselage as shown in the second photo.

☐ Step 4

Use a file or rotary tool to grind a flat area on the axle where the screws from the wheel coller will be positioned when tightened.

Note: Use threadlock on all metal-to-metal fasteners to prevent them from vibrating loose in flight.

☐ Step 5

Slide a 5/32-inch wheel collar onto the axle then the wheel. A second wheel collar is then placed on the axle. Install the 3mm x 4mm machine screws away from the fuselage so they can be accessed later.

☐ Step 6

Attach the wheel pant to the landing gear using two 4-40 x 1/2-inch socket head screws and two #4 washers.
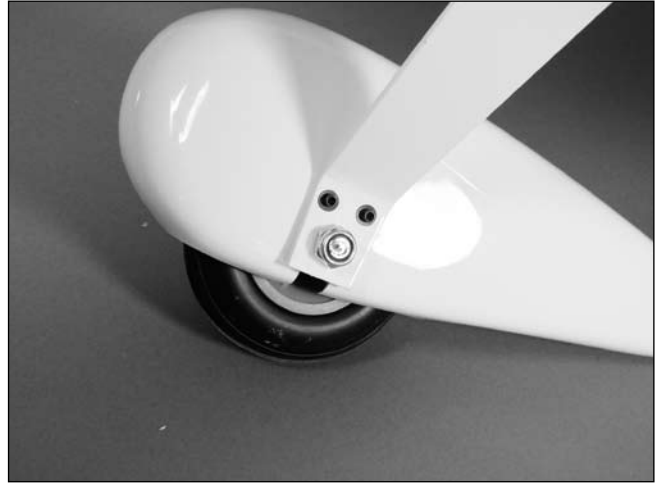
☐ Step 7

Loosen the 3mm x 4mm machine screws in the wheel collars. Position the wheel so it is centered in the opening in the wheel pant. Tighten the screws to secure the wheel in position.

Aileron Installation

Required Parts

- Wing (left and right)
- Aileron (left and right)
- $2\,^3/_4$ pushrod linkage
- Control horn connector (2)
- Ball link end w/hardware(2)
- 8-32 x $2\,^1/_4$-inch countersunk screw (2)
- CA hinge (8)
- 8-32 flanged nut (2)

Required Tools and Adhesives

- Servo (2)
- String
- Rotary tool
- Drill bit: 1/16-inch (1.5mm), 7/65-inch (3mm)
- 9-inch (228mm) servo extension (2)
- Thin CA
- T-pins

☐ ☐ Step 1

Remove the servo horn from the servo. Secure a 9-inch (305mm) servo extension to the servo lead using string or a commercially available connector.
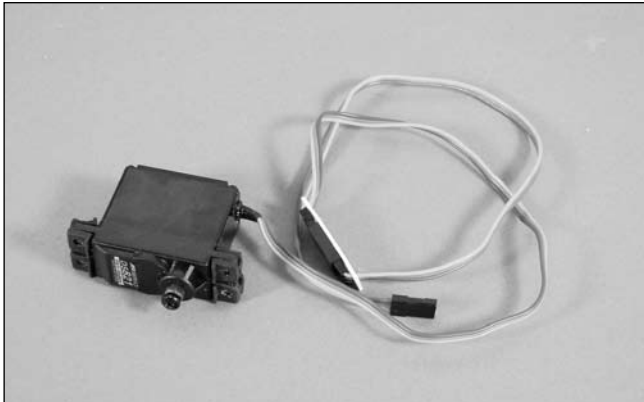
☐ ☐ Step 2

Tie a weight to a string and lower the weight into the opening for the aileron servo.
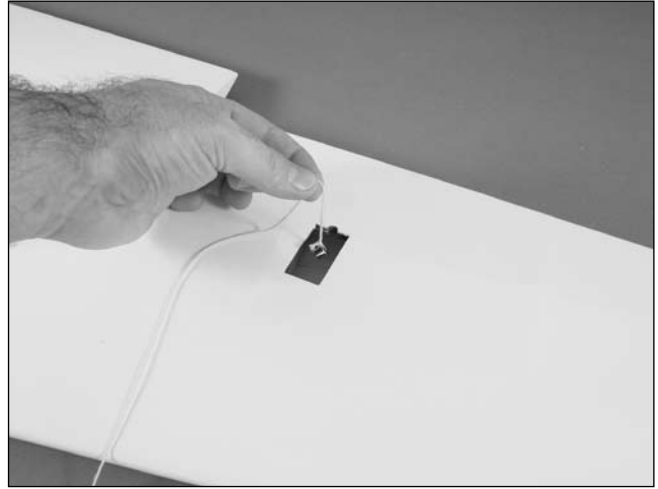
☐ ☐ Step 3

Position the wing with the tip up. Allow the weight and string to lower through the wing and out the root rib as shown.
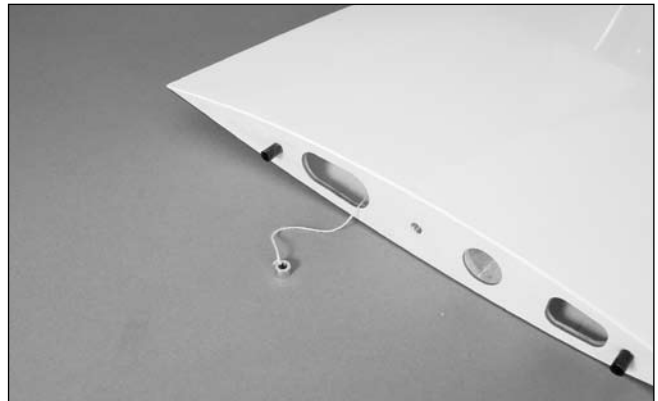
☐ ☐ **Step 4**

Tie the string to the servo extension. Use the string to pull the servo extension through the wing.
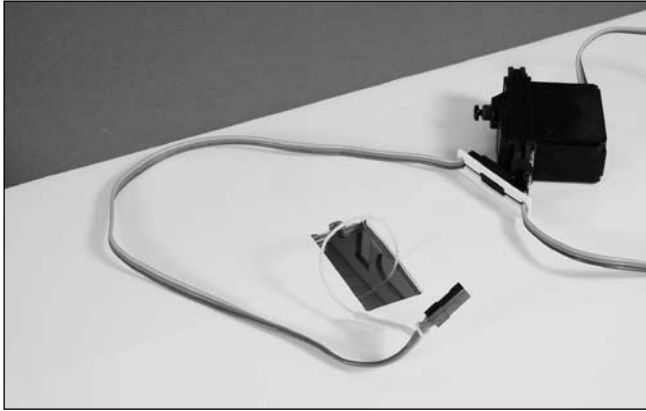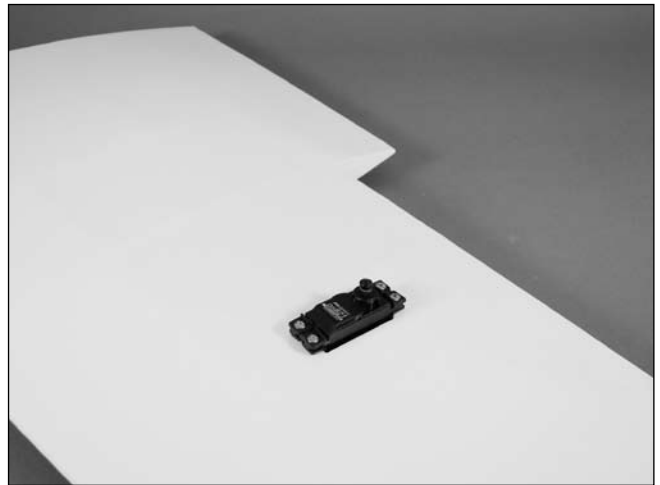

☐ ☐ **Step 5**

Thread the screws to mount the servo into the holes, then remove them. Apply a few drops of thin CA into the holes to harden the threads.
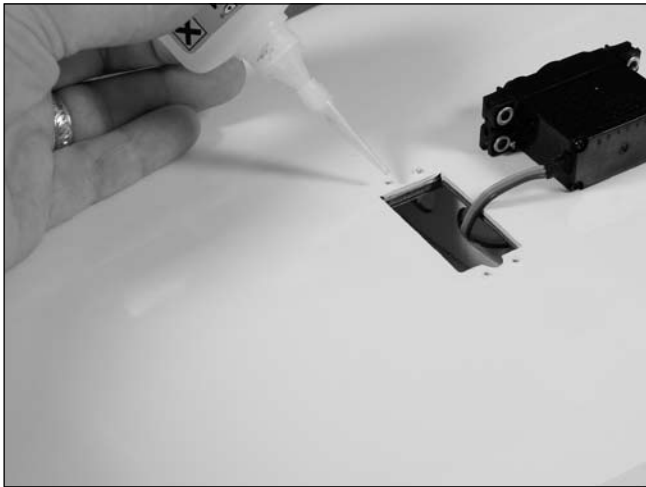
☐ ☐ **Step 6**

Use the hardware provided with the servo to secure it in the wing. The output shaft of the servo will face toward the aileron. After installing the screws, remove them and soak thin CA into the holes to harden the threads.

☐ ☐ **Step 7**

Use a rotary tool and 1/16-inch (1.5mm) drill bit to drill a hole in the center of each of the four hinge slots in the wing.

# Aileron Installation

☐ ☐ **Step 8**

Position the aileron against the wing. Transfer the location of the holes drilled in the previous step to the aileron. Use a rotary tool and 1/16-inch (1.5mm) drill bit to drill holes at these locations.
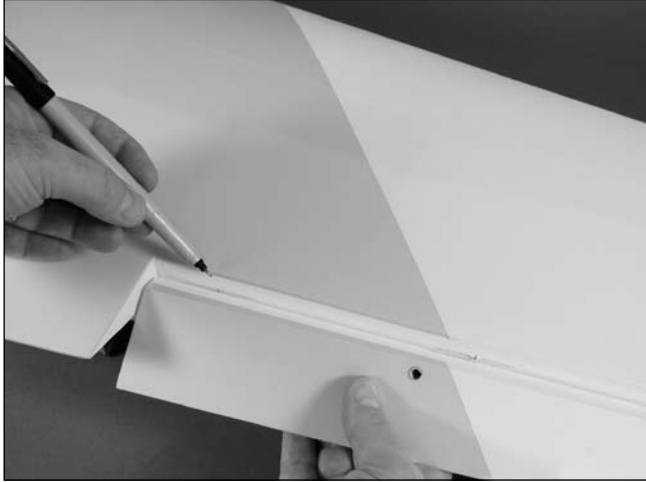
> **Note**: Steps 6 and 7 are to create a tunnel for the CA to wick into the hinge. This provides the best bond between the hinge and gluing surfaces.
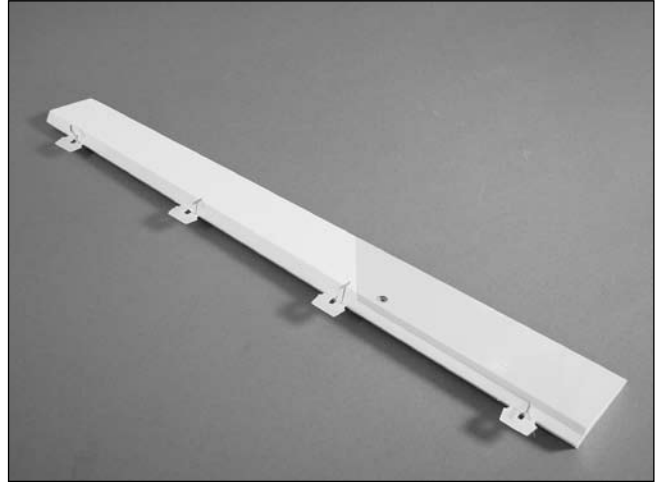
☐ ☐ **Step 9**

Place a T-pin in the center of four of the CA hinges.
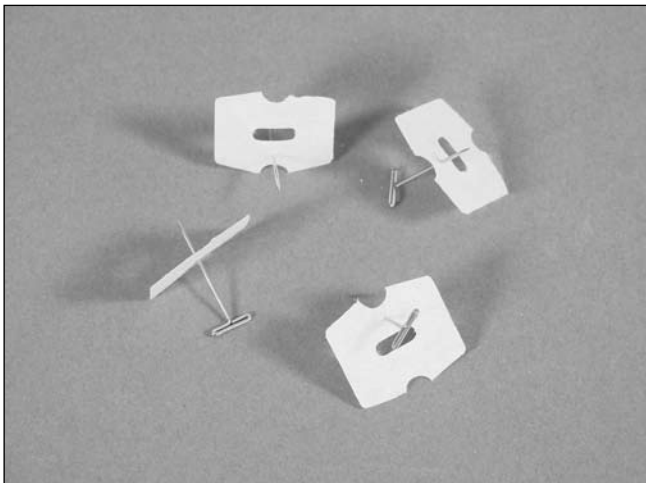
☐ ☐ **Step 10**

Position the CA hinges in the aileron. The slot in the hinge will align with the hole drilled in the aileron in Step 7.

☐ ☐ **Step 11**

Slide the hinges in the aileron into the slots in the wing. Position the aileron so there is equal distance at each end between the wing and aileron. Remove the T-pins and push the aileron tight against the wing. Flex the aileron and apply thin CA to each of the four hinges. Make sure to apply CA to both the top and bottom of each hinge.
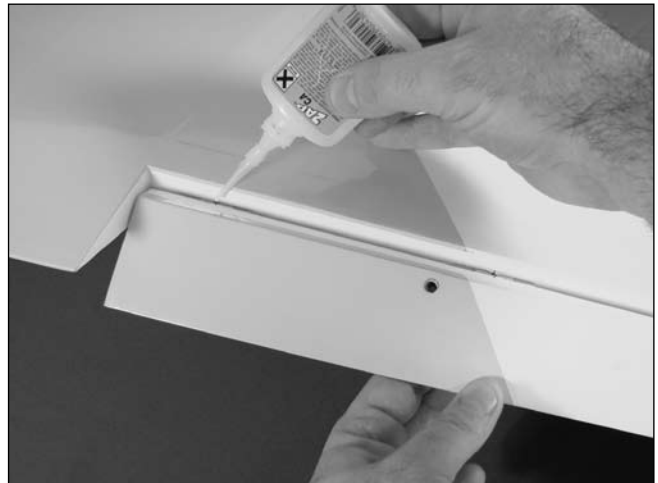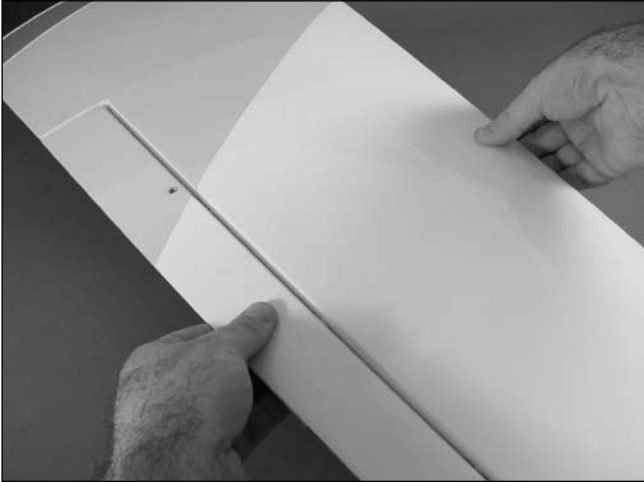

> **Note**: Do not use CA accelerator on the hinges. The CA must be allowed to wick fully into the hinge to provide the best bond between the hinge and surrounding wood.

☐ ☐ **Step 12**

Once the CA has fully cured lightly pull on the wing and aileron to make sure the hinges are securely glued to the wing and aileron.

☐ ☐ **Step 13**

Flex the aileron up and down a few times to break in the hinge.

☐ ☐ **Step 14**

Slide the 8-32 x 2 $\frac{1}{4}$-inch countersunk screw through the hole in the aileron from the top of the wing. Secure the screw using an 8-32 flanged nut. Use threadlock on the screw and nut to prevent vibrations from loosening the nut.
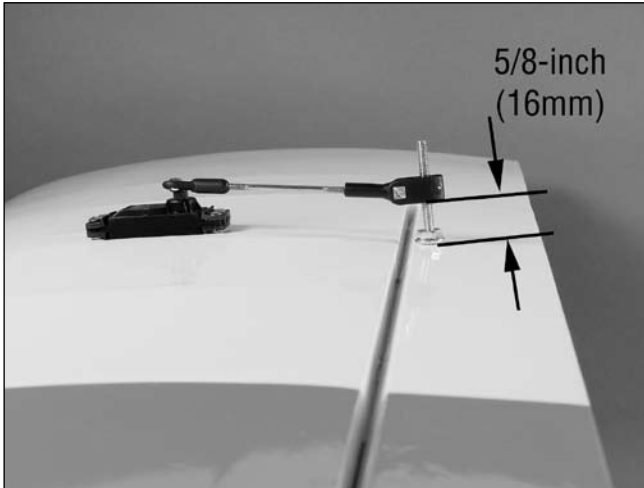

☐ ☐ **Step 15**

Assemble the aileron linkage using the 2 $\frac{3}{4}$-inch control rod, ball end and control horn connector as shown. The length of the linkage will be approximately 4 inches (102mm).


4 Inches
(102mm)
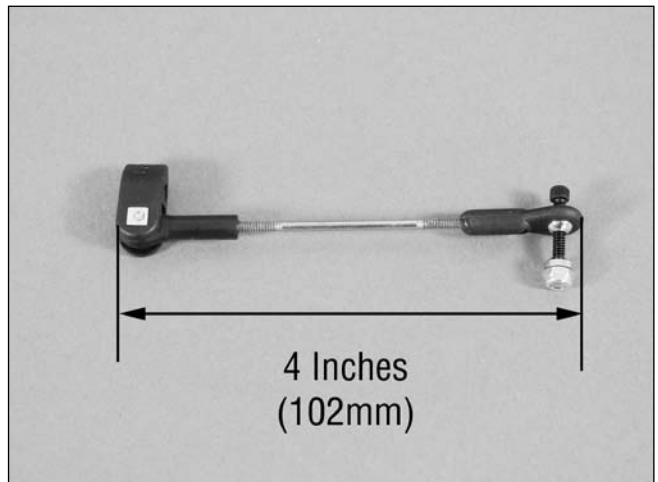
Aileron Installation

☐ ☐ Step 16

Thread the control horn connector onto the countersunk screw so the distance between the control surface and bottom of the connector is 5/8-inch (16mm).
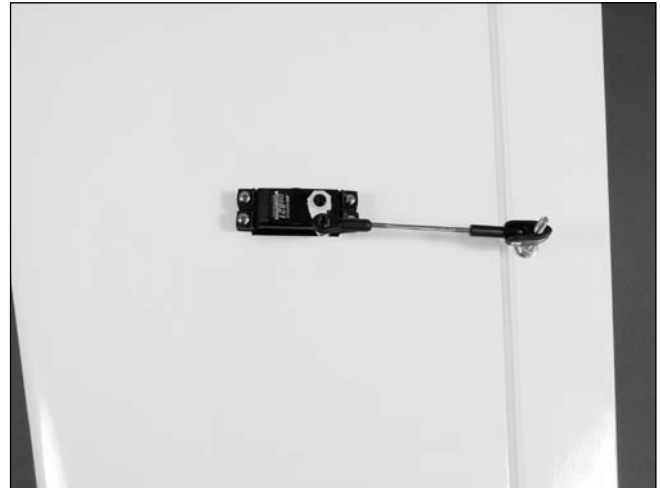

☐ ☐ Step 17

Drill a 7/64-inch (3mm) hole through the control horn that is 1/2-inch (13mm) from the center of the servo arm. Attach the ball end to the servo horn using the hardware provided with the kit.
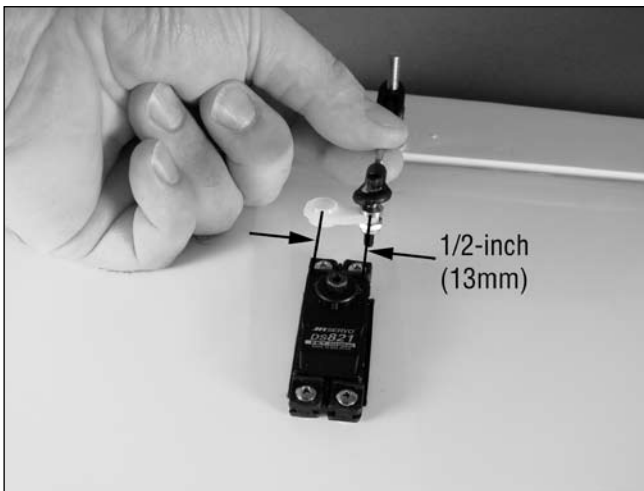
☐ ☐ Step 18

Secure the servo horn to the servo so it is parallel to the aileron hinge line. Adjust the length of the linkage so the aileron is in the neutral position.

☐ Step 19

Repeat Steps 1 through 18 for the remaining wing and aileron.

Rudder Installation

Required Parts

- Fuselage
- Rudder
- CA hinge (4)
- 8-32 flanged nut
- Tailwheel assembly
- Steering bracket
- Metal clevis
- 4-40 nut
- Control horn connector
- 1/4-inch tubing
- Steering spring (2)
- $5 \frac{1}{2}$-inch (140mm) pushrod
- 8-32 x $2\frac{1}{4}$-inch countersunk screw
- #4 x 5/8-inch sheet metal screw (2)
- #2 x 1/2-inch sheet metal screw (2)

Required Tools and Adhesives

- Drill
- Hex wrench: 3/32-inch
- T-pins
- Felt-tipped pen
- Pliers
- 18-inch (458mm) servo extension
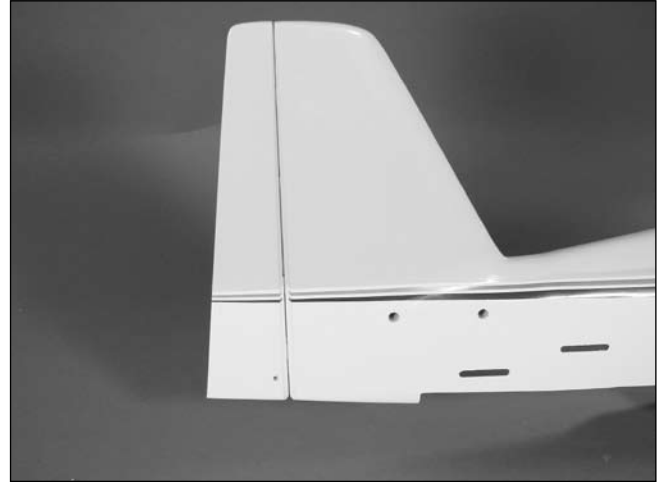- Drill bit: 5/64-inch (2mm)

☐ Step 1

Remove the hatch covering the location for the rudder and elevator servos.
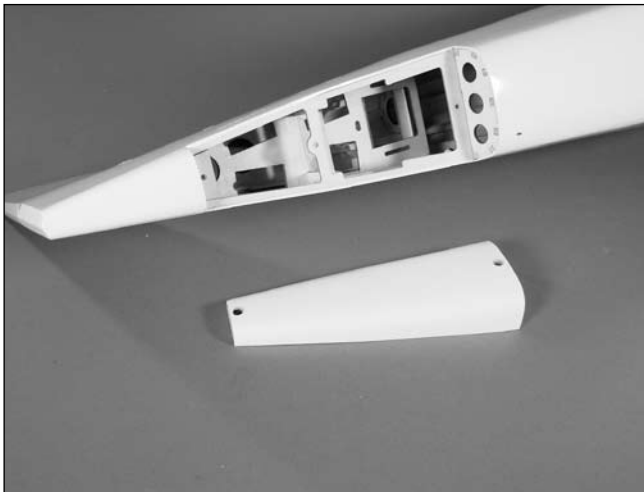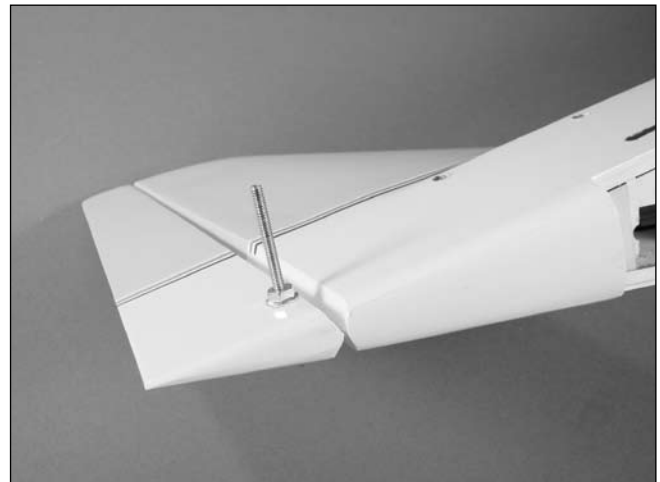

☐ Step 2

Use four CA hinges to attach the rudder to the fin and fuselage. Follow the same procedure as described in hinging the ailerons.

☐ Step 3

Install the 8-32 x $2\frac{1}{4}$-inch countersunk screw and secure it using an 8-32 flanged nut. Use threadlock on the screw and nut to prevent vibrations from loosening the nut.

Rudder Installation

☐ Step 4

Position the tailwheel assembly onto the bottom of the fuselage. Make sure the bracket is as far forward as possible but does not overlap onto the servo opening. Use a felt-tipped pen to mark the locations for the two screws.
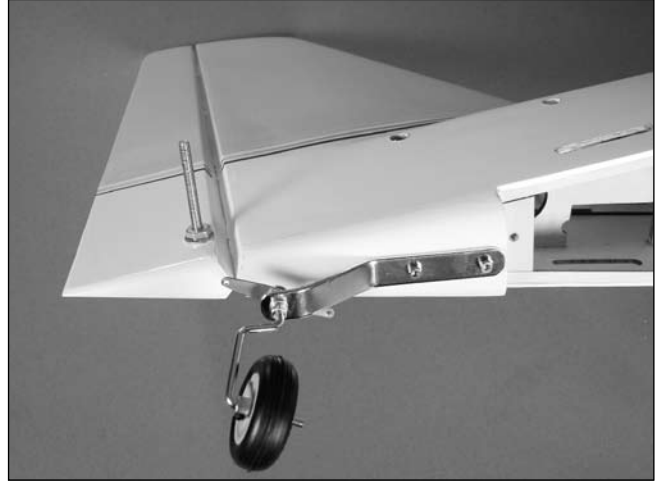

☐ Step 5

Drill two 5/64-inch holes at the locations marked in the previous step.

☐ Step 6

Attach the tailwheel bracket using two #4 x 5/8-inch sheet metal screws. After installing the screws, remove them and soak thin CA into the holes to harden the threads.

☐ Step 7

Position the steering bracket with the front edge roughly 3/4-inch back from the rudder hinge line. Attach the steering bracket to the bottom of the rudder using two #2 x 1/2-inch sheet metal screws. After installing the screws, remove them and soak thin CA into the holes to harden the threads.

3/4-inch
(19mm)
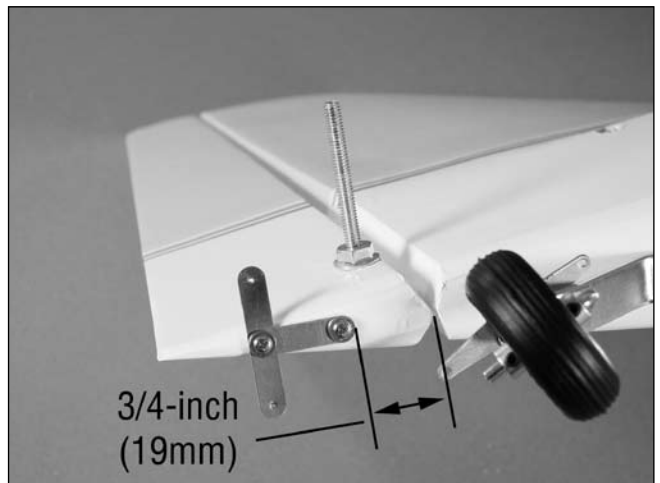
Rudder Installation

☐ Step 8

Use the two steering springs to connect the steering bracket to the tailwheel actuator. You will need to bend the springs at each end using pliers to make the connections.


☐ Step 9

Attach an 18-inch (458mm) servo extension to the rudder servo. Install the rudder servo into the fuselage using the hardware provided with the servo. With the rudder servo centered using the radio, install a long servo horn onto the rudder servo positioned so it is perpendicular to the fuselage center line.


☐ Step 10

Thread the control horn connector onto the countersunk screw so the distance between the control surface and bottom of the connector is 13/16-inch (20mm).
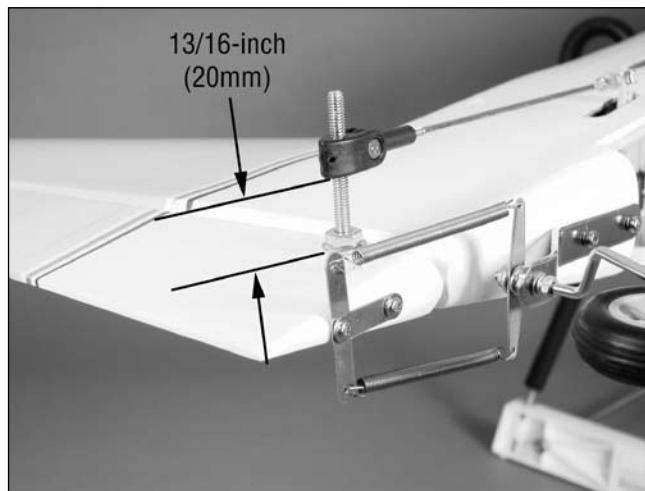
☐ Step 11

Assemble and install the linkage for the rudder servo using a 5 $\frac{1}{2}$-inch pushrod. The end attaching to the servo is prepared by threading a 4-40 nut onto the linkage. Slide a 1/4-inch piece of tubing onto the clevis and thread the clevis onto the linkage. Adjust the length of the linkage to approximately 6 $\frac{1}{2}$-inch (165mm). Attach the clevis to the control horn so it is 3/4-inch (19mm) from the center of the servo arm.
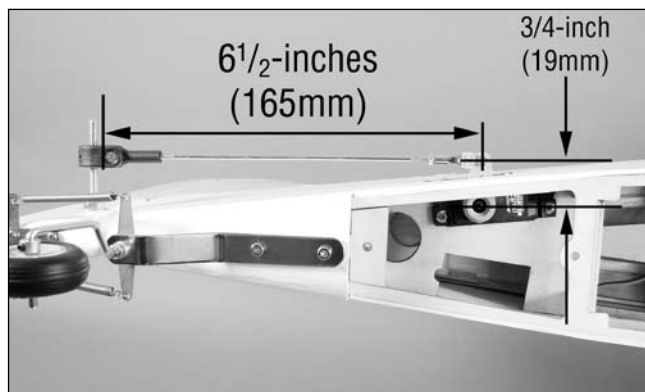
Note: Once the linkage has been adjusted to its final length, tighten the 4-40 nut against the clevis to keep them from vibrating loose and changing the length of the linkage.

Important: Use threadlock on any metal-to-metal fasteners.

Stabilizer Installation

Required Parts

- Fuselage
- Stabilizer tube (short)
- Stabilizer (right and left)
- Metal clevis (2)
- Control horn connector (2)
- $6\frac{1}{2}$-inch (165mm) pushrod linkage (2)
- 8-32 x $2\frac{1}{4}$-inch countersunk screw (2)
- Elevator (right and left)
- 4-40 x 3/8-inch socket head screw
- Stabilizer tube (long)
- 8-32 flanged nut (2)
- #4 washer (2)
- 4-40 nut (2)
- 1/4-inch tubing (2)

Required Tools and Adhesives

- Ruler
- Drill
- Tap handle
- 18-inch (458mm) servo extension (2)
- Hex wrench: 3/32-inch
- Drill bit: 3/32-inch (2.5mm) or #43
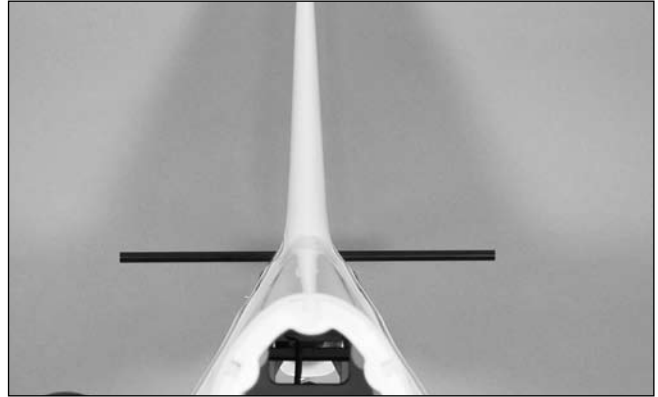- Felt-tipped pen
- 4-40 tap

☐ Step 1

Hinge the elevators to the stabilizers following the same procedure as hinging the ailerons.
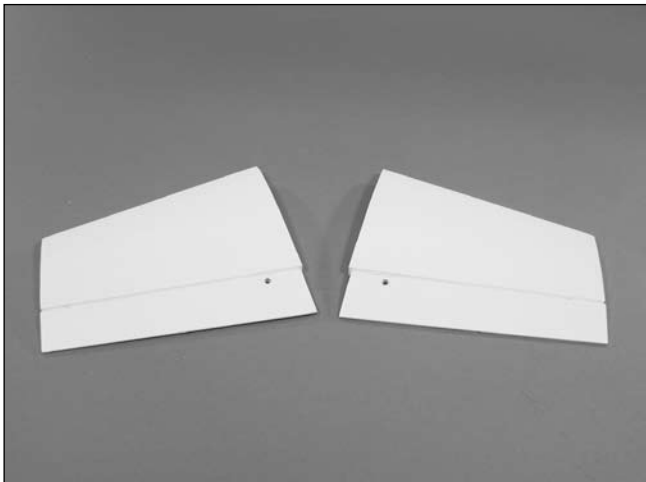
Note: The Sundowner is supplied with two sets of stabilizer tubes. Use the heavier steel tubes with a heavier engine like the Evolution 35GT2. The lighter aluminum tubes are to be used with lighter engine selections such as the Saito .180 four-stroke.

☐ Step 2

Slide the longer stabilizer tube into the rear fiberglass tube in the fuselage. Center the rod in the fuselage.
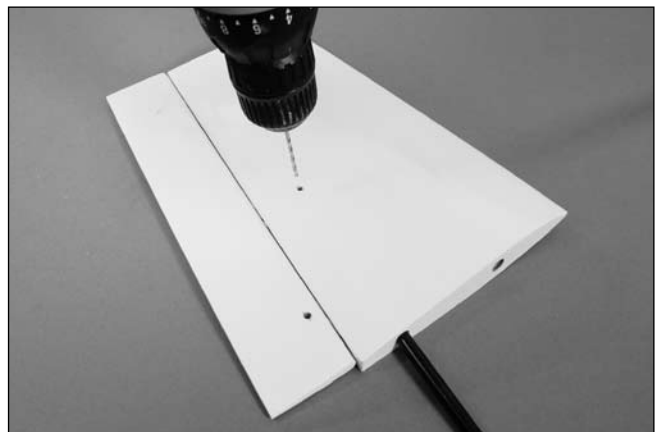

☐ Step 3

Mark the tube at the fuselage using a felt-tipped pen.
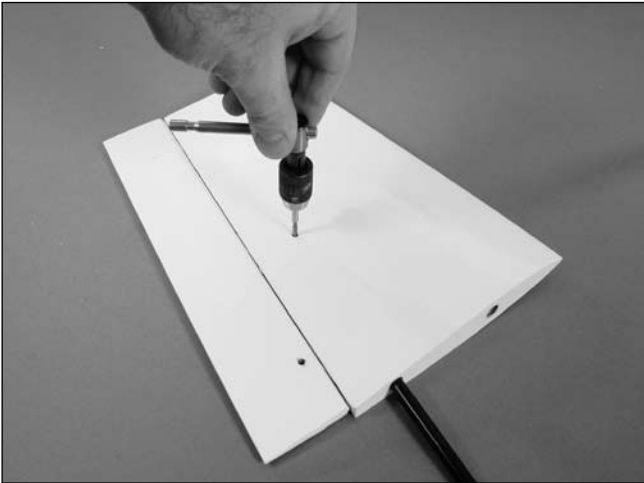

☐ Step 4

Remove the tube and slide it into one of the stabilizers up to the line drawn in the previous step. Use a drill and 3/32-inch (2.5mm) or #43 drill bit to drill a hole into the tube, but not through the tube.

☐ **Step 5**

Tap the hole made in the previous step using a 4-40 tap.

☐ **Step 6**

Secure the tube using a 4-40 x 3/8-inch socket head screw and #4 washer.
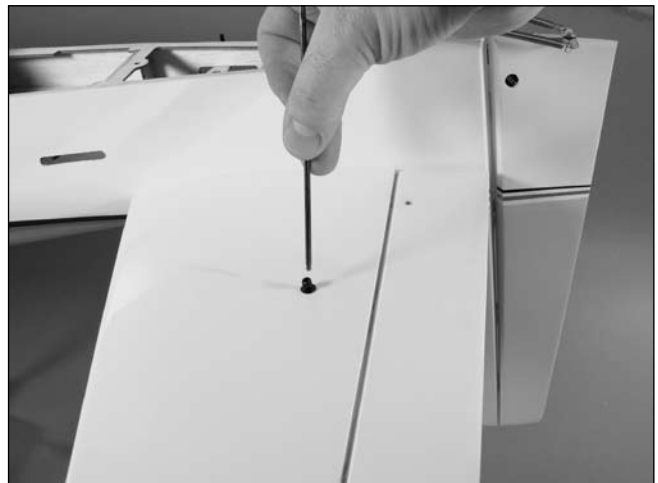

☐ **Step 7**

Slide the short stabilizer tube into the hole in the stabilizer toward the leading edge. Slide the assembly into the fuselage.


☐ **Step 8**

Slide the remaining stabilizer onto the tubes. Press the two stabilizers tight against the fuselage. Repeat Steps 4 through 6 to secure the stabilizer to the tubes and in the fuselage.

Stabilizer Installation

☐ Step 9

Secure an 18-inch servo extension to each of the elevator servos. Install the servos into the fuselage. Install large control horns on the servos in-line with each other.

Align servo arms
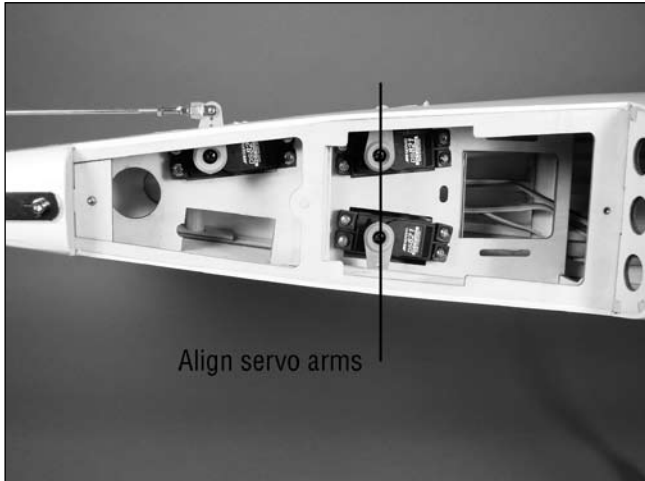
☐ Step 10

Install the 8-32 x $2\frac{1}{4}$-inch countersunk screw and secure it using an 8-32 flanged nut. Use threadlock on the screw and nut to prevent vibrations from loosening the nut.

☐ Step 15

Assemble the elevator linkage using the $6\frac{1}{2}$-inch control rod, clevis, 4-40 nut and 1/4-inch (4mm) tubing and control horn connector as shown. The length of the linkage will be approximately $7\frac{1}{4}$-inch (184mm).

$7\frac{1}{4}$-inches
(184mm)
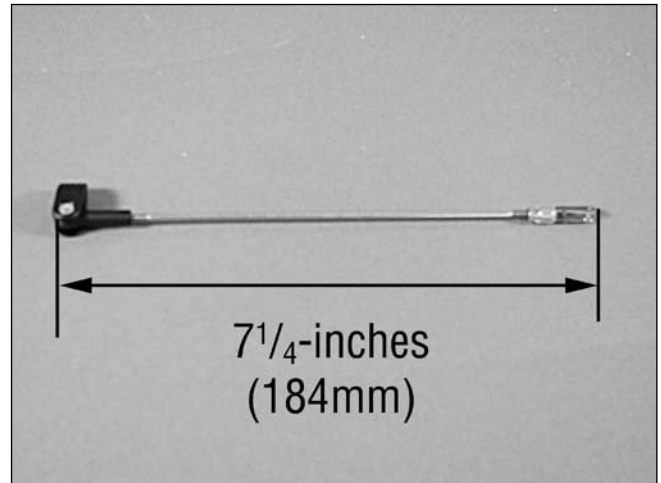
☐ Step 11

Thread the control horn connector onto the countersunk screw so the distance between the control surface and bottom of the connector is 7/8-inch (22mm).

7/8-inch
(22mm)
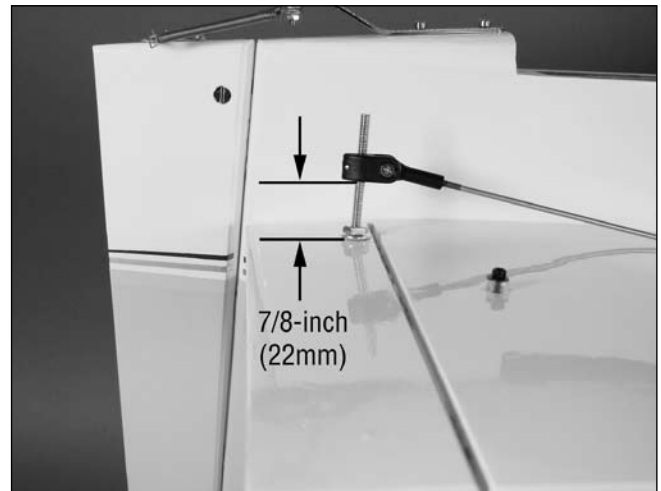
☐ **Step 12**

Install the 6$\frac{1}{2}$-inch (165mm) pushrods to operate the elevator. Attach the clevis to the control horn so it is 3/4-inch (19mm) from the center of the servo arm.

☐ **Step 13**

Replace the hatch back onto the fuselage to cover the servos.
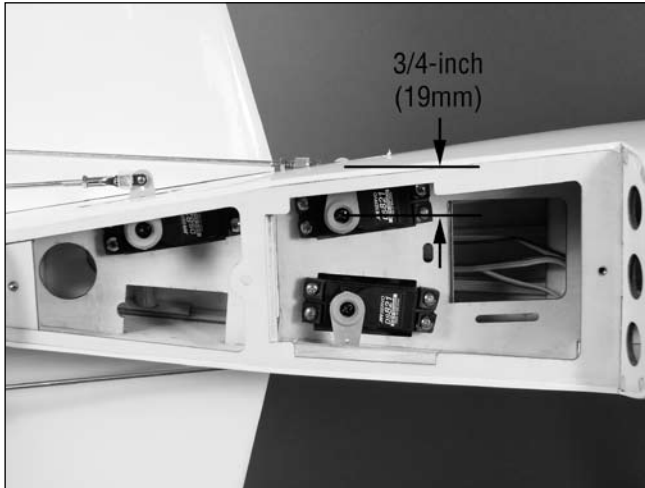

Engine and Receiver Installation (Gas)

Required Parts

- Fuselage assembly
- Engine mount (right and left)
- Engien mount template
- Fuel tank

Required Tools and Adhesives

- Drill
- 1/4-inch fuel tubing (3)
- #8 washer (12)
- Threadlock
- Soldering iron
- 8-32 x 1-inch machine screw (4)
- 8-32 x 1$\frac{1}{4}$-inch machine screw (4)
- 4-40 x 1/2-inch socket head screw
- 4-40 x 1-inch socket head screw (2)
- Drill bit: 1/16-inch (1.5mm), 13/64-inch (5.5mm)
- 6-inch (152mm) servo extension (3)
- 8-32 blind nut (4)
- #4 washer (3)
- 8-32 lock nut (4)
- Solder

☐ **Step 1**

Position the engine mount template onto the front of the fuselage. Use a 1/16-inch drill bit to drill pilot holes through the template and into the firewall.

☐ **Step 2**

Remove the template from the fuselage. Use a 13/64-inch drill bit to enlarge the holes so the blind nuts can be installed.

☐ **Step 3**

Attach the engine mount to the firewall using four 8-32 x 1-inch machine screws, four #8 washers and four 8-32 blind nuts. Use threadlock on the screws to prevent vibrations from loosening the screws.

Note: The arrows on the engine mounts will face the opening for the throttle servo when installed correctly.

☐ **Step 4**

Attach the engine using four 8-32 x $1\frac{1}{4}$-inch machine screws, eight #8 washers and four 8-23 lock nuts. Position the engine so the drive washer is $5\frac{7}{8}$ inches (150mm) forward of the firewall before tightening the screws.

$5\frac{7}{8}$-inches
(150mm)
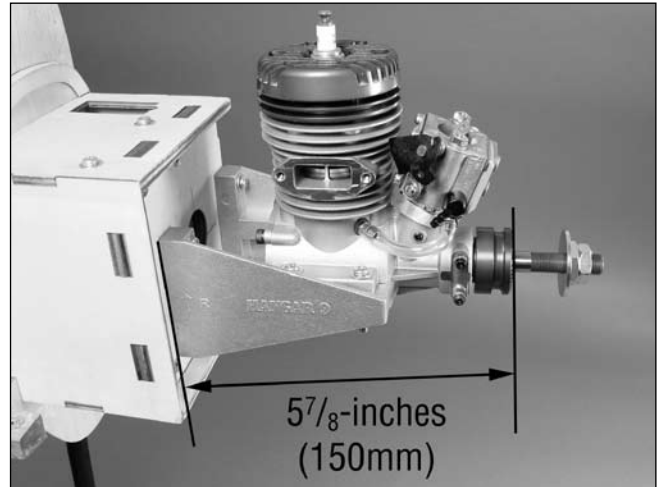
☐ **Step 5**

Attach the igintion module to the bottom of the engine box using #4 x 1/2-inch sheet metal screws and #4 washers. This hardware is not included with your Sundowner.
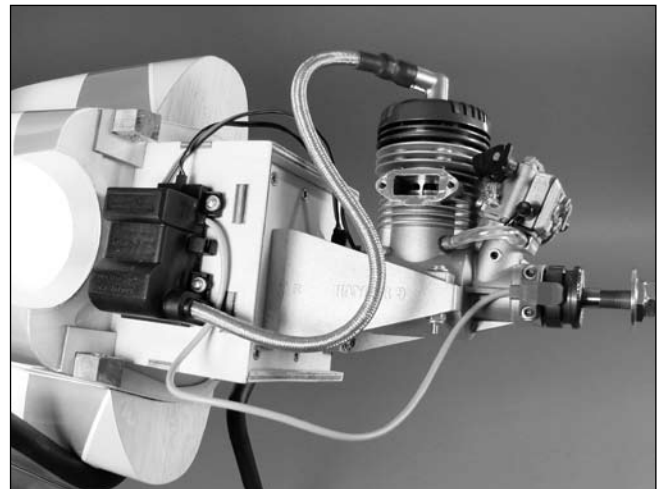
☐ Step 6

Attach a 6-inch servo extension to the throttle servo. Drill a hole in the engine box to route the the ignition battery lead. Route the ignition module lead through the hole and into the fuselage. Mount the throttle servo using the hardware provided with the servo.

Note: Always keep the power lead from the ignition module away from the radio system to avoid any radio interference.

☐ Step 7

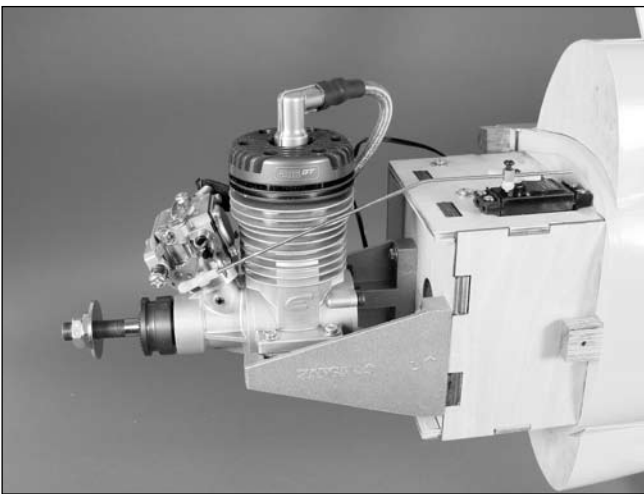Connect the throttle linkage to the carburetor of your engine. Connect any items from the ignition module to the engine at this time as well.

☐ Step 8

Plug the rudder, elevator, throttle and any other extension into the receiver. Wrap the receiver in foam and secure it inside the fuselage. A tube has been installed inside the fuselage so the antenna can be routed through the fuselage.
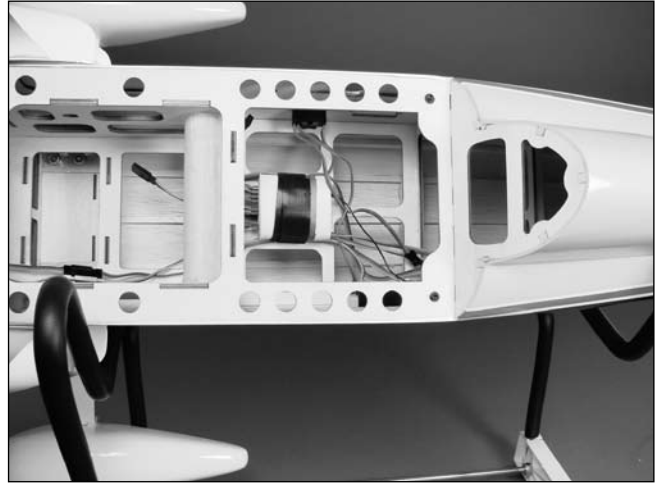
Note: Never cut the antenna on your receiver. This will greatly reduce the range of your radio system.

Note: The following steps are necessary when installing a gas engine. Failure to change the fuel lines and secure them properly may cause your engine to stop in flight.

☐ Step9

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.

Apply Solder
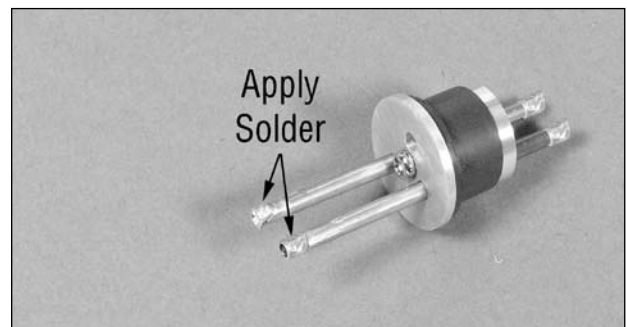
☐ Step 10

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.

☐ Step 11

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 3mm x 20 screw carefully—do not over-tighten.

☐ Step 12

Slide the fuel tank into position inside the fuselage. Guide the fuel lines through the opening in the firewall while installing the tank. Secure the rear of the fuel tank with the supplied piece of plywood.

☐ Step 13

Connect the line from the clunk to the carburetor. The vent line will be directed toward the bottom of the fuselage and secured so it won't interfere with the operation of the engine.

Note: We used a fuel dot and T-fitting on our model so the cowl won't have to be removed to fuel the engine.

☐ Step 14

Install the receiver battery and the battery for the ignition module at this time. Make sure both are secure and will not move in flight.
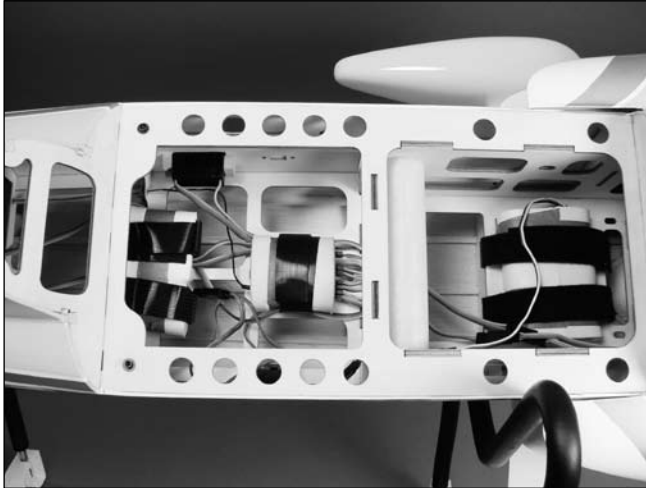
Note: The location of the receiver and ignition battery may vary depending on the engine used and the size of the battery used. Feel free to locate the batteries as necessary to correctly balance your model.

☐ Step 15

Attach the muffler to your engine.

Evolution 26GT2

Evolution 35GT2
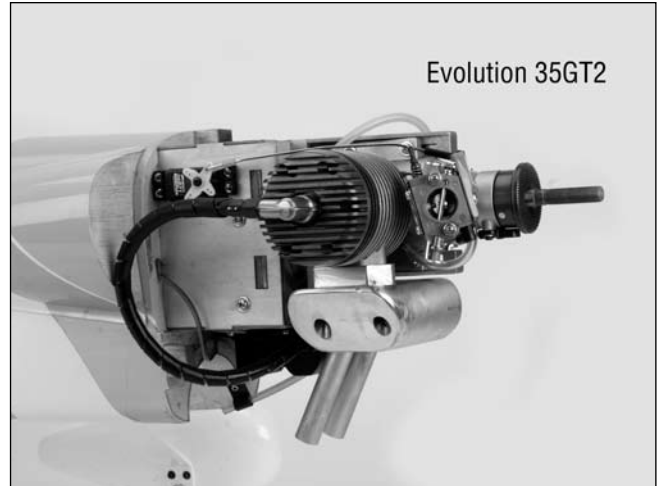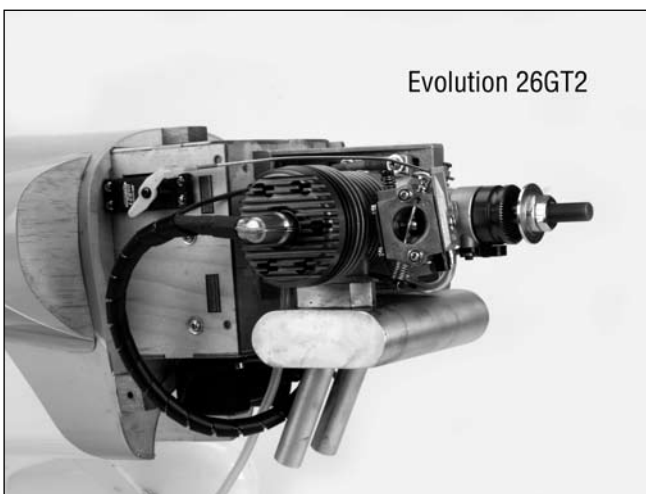
☐ Step 16

Slide a #4 washer and a 1/4-inch piece of fuel tubing onto each of the two 4-40 x 1-inch socket head screws and the 4-40 x 1/2-inch socket head screw. Slide the cowling into position and trim as necessary to clear any part of the engine or exhaust system. Mount the fuel dot so it can be easily accessed and won't interfere with any part of the engine inside the cowling. Secure the cowl using the 1-inch socket head screws on the sides and the 1/2-inch screw on the top of the cowling. Complete the engine installation by installing the propeller and spinner onto the engine.

Engine and Receiver Installation (Glow)

Required Parts

- Fuselage assembly
- Fuel tank
- Engine mount template
- Engine mount (right and left)

Required Tools and Adhesives

- Drill
- 8-32 blind nut (4)
- 1/4-inch fuel tubing (3)
- #4 washer (3)
- #8 washer (12)
- 8-32 lock nut (4)
- Threadlock
- $2\frac{1}{8}$ (54mm) threaded rod
- Rotary tool w/sanding drum
- 8-32 x 1-inch machine screw (4)
- 2-56 ball link end w/hardware (2)
- 8-32 x $1\frac{1}{4}$-inch machine screw (4)
- 4-40 x 1/2-inch socket head screw
- 4-40 x 1-inch socket head screw (2)
- Drill bit: 1/16-inch (1.5mm), 13/64-inch (5.5mm)
- 6-inch (152mm) servo extension (3)

☐ Step 1

Position the engine mount template onto the front of the fuselage. Use a 1/16-inch drill bit to drill pilot holes through the template and into the firewall.

☐ Step 2

Remove the template from the fuselage. Use a 13/64-inch drill bit to enlarge the holes so the blind nuts can be installed.

☐ Step 3

Attach the engine mount to the firewall using four 8-32 x 1-inch machine screws, four #8 washers and four 8-32 blind nuts. Use threadlock on the screws to prevent vibrations from loosening the screws.

Note: The arrows on the engine mounts will face the opening for the throttle servo when installed correctly.

☐ Step 4

Attach the engine using four 8-32 x $1\frac{1}{4}$-inch machine screws, eight #8 washers and four 8-32 lock nuts. Position the engine so the drive washer is $5\frac{7}{8}$ inches (150mm) forward of the firewall before tightening the screws.
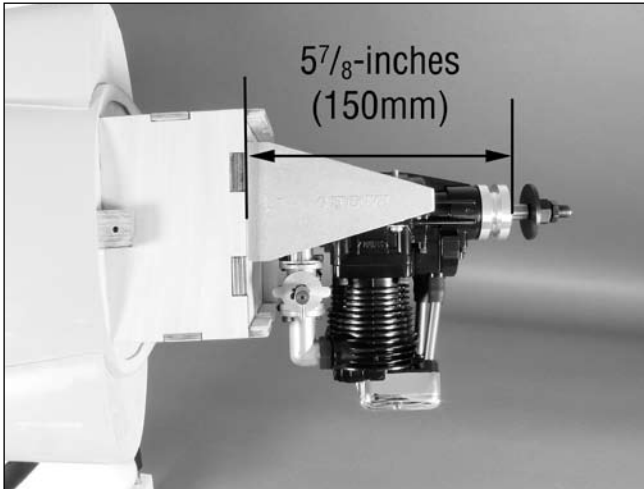
Note: You may need to rotate the carburetor on your particular engine so the throttle arm faces down to align with the notch made in the engine box.

☐ Step 5

Attach a 6-inch servo extension to the throttle servo. Mount the throttle servo using the hardware provided with the servo.
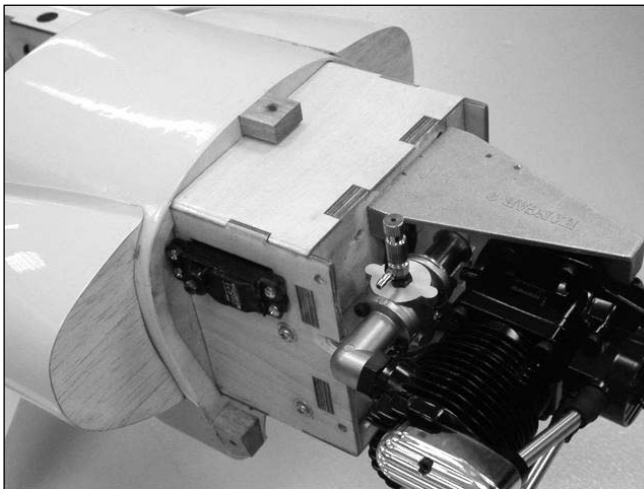
☐ Step 6

Assemble a throttle pushrod using two 2-56 ball ends and a $2\frac{1}{8}$-inch (54mm) piece of 2-56 threaded rod. The length of the linkage will be approximately $3\frac{1}{2}$-inch (90mm).
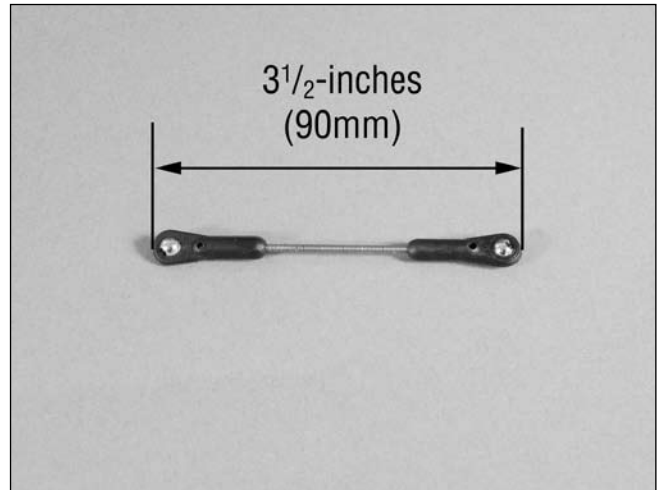
☐ Step 7

Connect the throttle linkage between the carburetor of your engine and the servo arm. Adjust the length of the linkage as necessary.
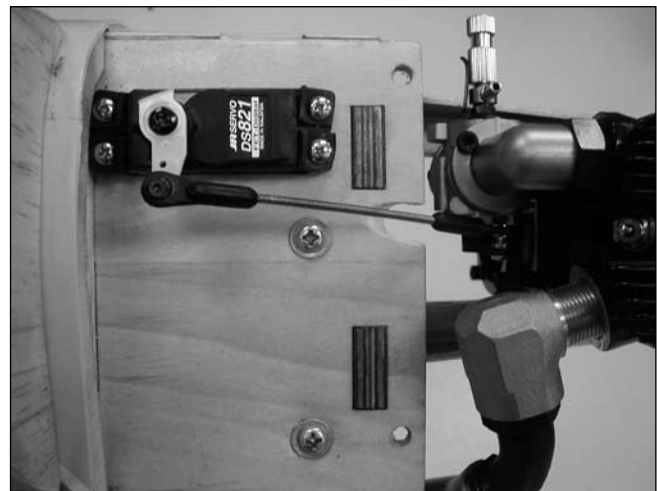
Note: Use threadlock on all metal-to-metal fasteners to prevent them from vibrating loose in flight.

Engine and Receiver Installation

☐ Step 8

Plug the rudder, elevator, throttle and any other extension into the receiver. Wrap the receiver in foam and secure it inside the fuselage. A tube has been installed inside the fuselage so the antenna can be routed through the fuselage.
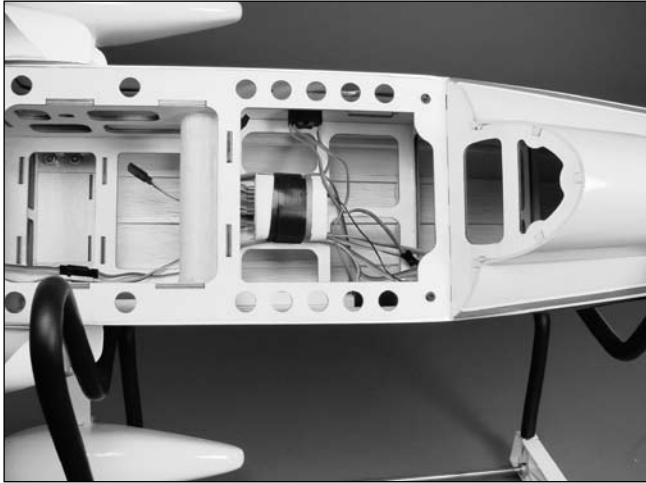
Note: Never cut the antenna on your receiver. This will greatly reduce the range of your radio system.

☐ Step 9

Slide the fuel tank into position inside the fuselage. Guide the fuel lines through the opening in the firewall while installing the tank. Secure the rear of the fuel tank with the supplied piece of plywood.

☐ Step 10

Connect the line from the clunk to the carburetor. The vent line will be attached once the muffler has been installed.

Note: We used a fuel dot and T-fitting on our model so the cowl won't have to be removed to fuel the engine.

☐ Step 11

Install the receiver battery at this time. Make sure it is secure and will not move in flight.
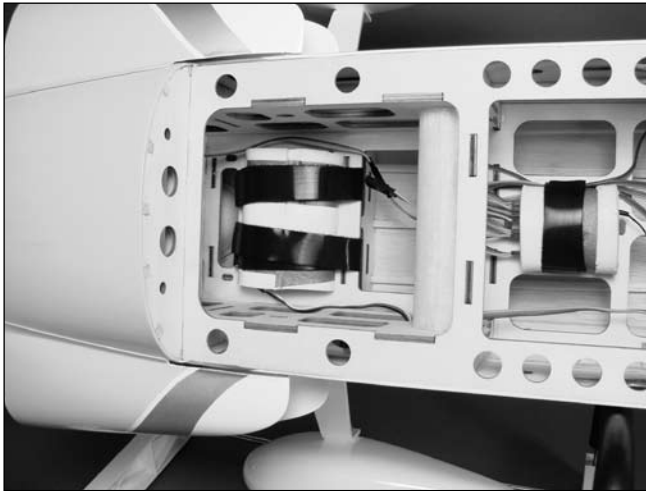
☐ Step 12

Attach the muffler to your engine. Connect the vent line to the muffler at this time.
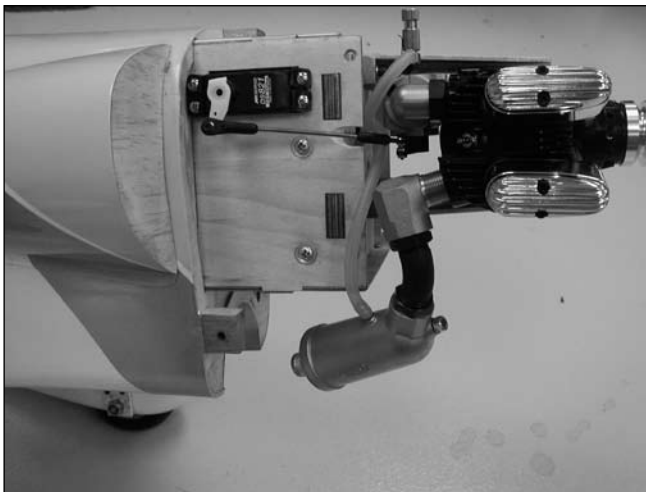
☐ Step 13

Slide a #4 washer and a 1/4-inch piece of fuel tubing onto each of the two 4-40 x 1-inch socket head screws and the 4-40 x 1/2-inch socket head screw. Slide the cowling into position and trim as necessary to clear any part of the engine or exhaust system. Mount the fuel dot so it can be easily accessed and won't interfere with any part of the engine inside the cowling. Secure the cowl using the 1-inch socket head screws on the sides and the 1/2-inch screw on the top of the cowling. Complete the engine installation by installing the propeller and spinner onto the engine.

Final Assembly

Required Parts

- Wing panel (left and right)
- Wing tube
- Canopy hatch
- Pilot head
- 1/4-20 x 1$\frac{1}{2}$-inch wing bolt (2)

Required Tools and Adhesives

- 30-minute epoxy
- Medium grit sandpaper

☐ Step 1

Locate the pilot head. Roughen the bottom of the head using medium grit sandpaper. Use 30-minute epoxy to glue the head into the cockpit.

☐ Step 2

Slide the wing tube into one of the wing panels.

☐ Step 3

Slide the tube into the fuselage while guiding the aileron servo lead through the hole in the side of the fuselage.

☐ Step 4

Secure the wing panel to the fuselage using a 1/4-20 x 1$\frac{1}{2}$-inch wing bolt.

☐ Step 5

Slide the remaining wing panel onto the wing tube. Secure the remaining panel using a 1/4-20 x 1$\frac{1}{2}$-inch wing bolt.

☐ Step 6

Install the canopy hatch back in position on the fuselage. Secure it using the two 4-40 socket head screws that were previously installed to hold the canopy hatch.

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 Sundowner is CG: $3\frac{1}{4}$ inches (82mm) back from leading edge of wing at the root rib. Make sure the aircraft is inverted when measuring the CG. If necessary, move the receiver or ignition (if using a gas-powered engine) 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. The CG Range for your Sundowner is 3–$3\frac{1}{2}$ inches (76mm–89mm) back from leading edge of wing at the root rib.
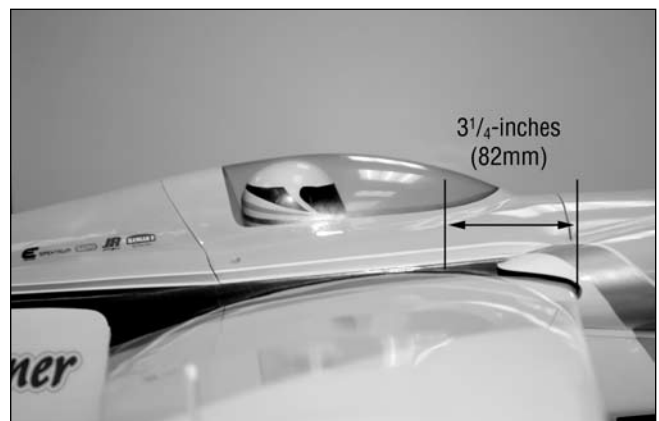
Control Throws

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:

High Rate: 5/8-inch (16mm) up/down
             15 degrees up/down
             15% Exponential
Low Rate: 5/16-inch (8mm) up/down
             8 degrees up/down
             7% Exponential

> **Note**: Aileron throw is measured at the trailing edge of the aileron nearest the fuselage.

Elevator:

High Rate: 9/16-inch (14mm) up/down
             12 degrees up/down
             20% Exponential
Low Rate: 3/8-inch (9.5mm) up/down
             8 degrees up/down
             10% Exponential

> **Note**: Elevator throw is measured at the trailing edge of the elevator next to the fuselage.

Rudder:

High Rate: 15/16-inch (24mm) left/right
             25 degrees left/right
             15% Exponential
Low Rate: 7/16-inch (11mm) left/right
             12 degrees left/right
             7% Exponential

> **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.

Slide tubing onto clevis

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.

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.)

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.

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