HANGAR 9 ®

Fly First Class™

YAK 54 89"

CARDEN AIRCRAFT
E D I T I O N

Specifications

Wingspan	89 in (226.1mm)	Engine Size	45–60cc gas
Length w/Spinner	84 in (213.4mm)	Radio	4-channels or more
Wing Area	1434 sq in (92.8 sq dm)	Servos	6 servos
Flying Weight	16.75–18.5 lb (7.6–8.4 kg)	Hardware Included	Yes

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
- T-pins
- Solder
- Solder gun
- Tape
- Phillips screwdriver
- Felt-tipped pen
- Hex wrench: 5/64-inch, 3/32-inch, 7/64-inch, 1/8-inch
- Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm), 5/32-inch (4mm), 3/16-inch (4.5mm)
- Hobby scissors
- Clamp
- Crimping tool/vice grips
- String
- 1/4-inch (6mm) foam
- Hobby knife
- Drill
- Nut driver: 1/4-inch
- Angle Pro Incidence Meter (HAN192)

Adhesives
- Thin CA (NHP411)
- 30-Minute Epoxy (HAN8002)
- CA Remover/Debonder (PAAPT16)
- Medium CA (PAAPT02)
- Formula 560 Canopy Glue (PAAPT56)
- Pacer Z-42 Threadlock (PAAPT42)

UltraCote Covering Colors

- White   (HANU870)
- Bright Yellow   (HANU872)
- Pearl Purple   (HANU847)
- Silver   (HANU881)

Before Starting Assembly

Before beginning the assembly of the YAK 54 89-inch, 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

- 7-channel computer radio system (minimum) w/receiver
- Large Servo Arms (JRPA236) (4 pkgs)
- 24-Inch Servo Extension (JRPA102) (2)
- JR Charge Jack Switch (JRPA004)
- JR Deluxe Switch (JRPA001) (1)
- 9-Inch Servo Extension (JRPA097) (3)
- 12-inch Servo Lead Extension (JRPA098) (2)
- Choke Ring (JRPA029) (For throttle servo lead)
- 3-inch Double Side Aluminum Adjustable Spline Servo Arm (JRPA237) (1 pkg)
- JR 8411, 8611A or 8711 Metal Geared high-torque servos (5) or equivalent

Caution: Only metal-geared servos of 180 oz/in torque or greater should be used on the control surfaces.

- 2700mAh or larger for receiver
- 1500mAh or larger for ignition (4.8 or 6.0V for DA-50, 2-cell Li-Po for Evolution® Gas engines)

The elevator installation will require:

Two servos and mixing through the radio

Or

Two servos and a JR® MatchBox™ (JPA0900)

Recommended JR, JRSPORT and Spektrum Systems

- JR 12X
- JR 10X
- JR XP9303
- JR X9303 2.4
- JR XP7202
- Spektrum DX-7

JR XP9303   **Spektrum DX7**   **JR 12X**

Recommended Engine Setup

DA-50
- In-cowl muffler

or

- MTW 75K canister with header
- 23 x 8 propeller

Evolution 50
- In-cowl muffler

or

- MTW 75K canister with header
- 23 x 8 propeller

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.

HANS2000   **HANS4010**

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. HAN4651   Fuselage w/Hatch
B. HAN4652   Right Wing Panel w/Aileron
C. HAN4653   Left Wing Panel w/Aileron
D. HAN4654   Right Stabilizer w/Elevator
E. HAN4655   Left Stabilizer w/Elevator
F. HAN4656   Anodized Wing Tube
G. HAN4657   Anodized Stabilizer Tube
H. HAN4658   Rudder
I. HAN4659   Canopy
J. HAN4660   Canopy Hatch
K. HAN4661   Fiberglass Painted Cowl

L. HAN4662   Landing Gear
M. HAN4664   Painted Wheel Pants
N. HAN4665   Hardware Kit
O. HAN364   Painted Pilot Helmet

Available Separately

HAN4663   Decal sheet
HAN332   Tail Wheel Assambly
HAN308   3.5-inch Pro-lite Wheels
HAN22GAS   22 oz. Gas Compatible Fuel Tank
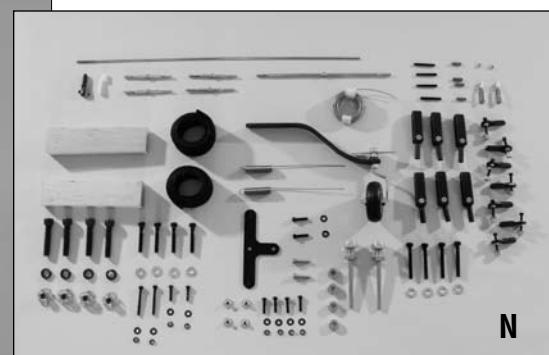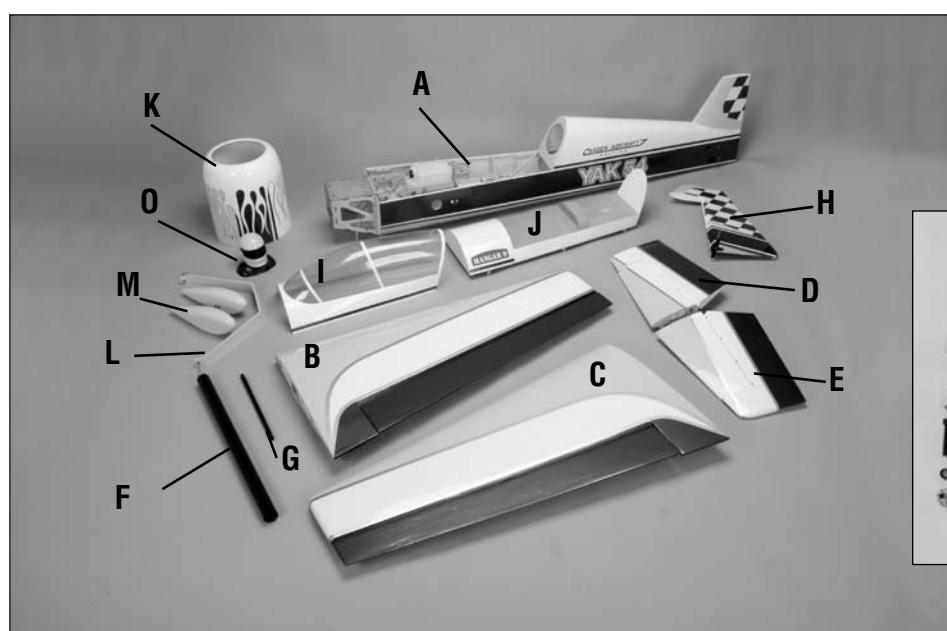
Aileron Servo Installation

Required Parts

- Wing panel (left and right)
- Control horn (2)
- Ball link w/hardware (2)
- Pro-Link, 2-inch (51mm) (2)
- 12-inch (305mm) extension (2)

Required Tools and Adhesives

- Ruler
- Servo w/hardware (2)
- Adjustable wrench
- 1 $1/_2$-inch Single Side Alum Adj. Spline Servo Arm (2)
- Pro-Link™ wrench (optional)

☐☐ Step 1

Thread the control horn onto the threaded rod. The distance between the aileron and the bottom of the horn is 27/32-inch (21.5mm).
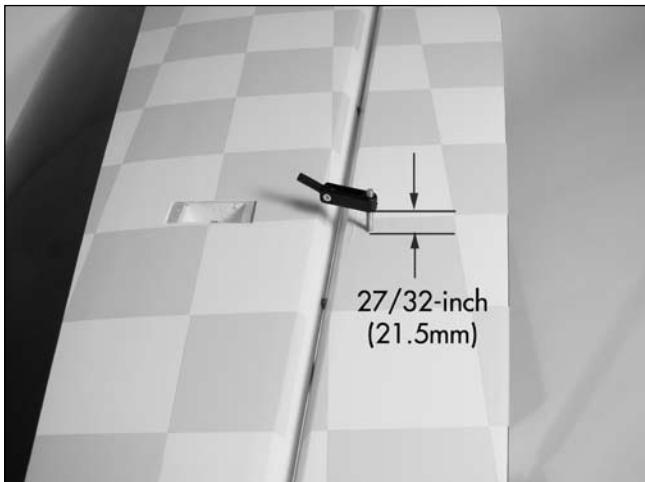

☐☐ Step 2

Attach a 12-inch (305mm) extension to the aileron servo lead. Use thread or a comercially available connector to make sure the extension and lead do not unplug accidentally inside the wing.
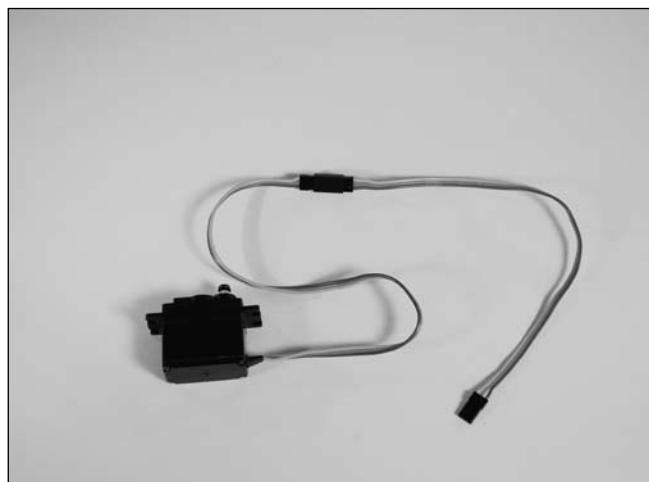
☐☐ Step 3

Tie the string to the end of the servo extension. Use the string to pull the servo lead through the wing.
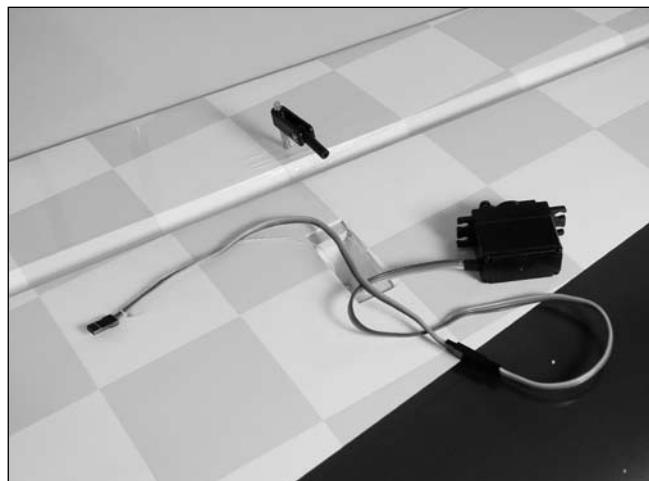
☐☐ Step 4

Use the servo hardware to mount the aileron servo in the wing. The output shaft of the servo will face toward the control horn.
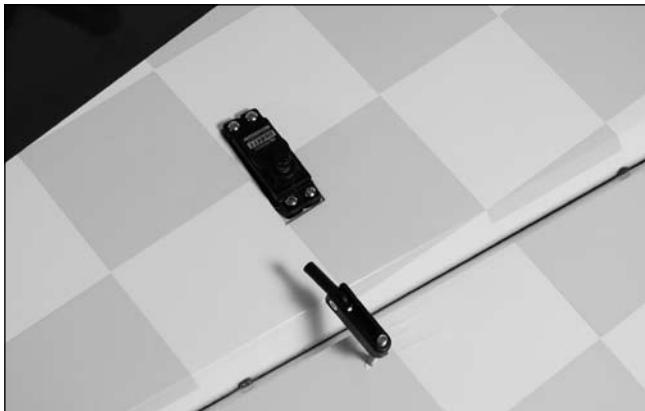
Hint: Use a pin drill and 1/16-inch (1.5mm) drill bit to predrill the holes for the servo mounting screws. This will prevent the wood from splitting when installing the servo. Apply 2–3 drops of foam-safe CA into each hole to harden the surrounding wood. This will make the screws more secure and prevent them from vibrating loose. Be careful not to use too much CA which can eat the underlying foam.

☐☐ Step 5

Use the radio system to center the aileron servo. Install the servo arm on the servo so it is parallel to the aileron hinge line. Attach the ball link to the outer hole (1 $\frac{1}{4}$-inches (32mm) from the center) of the servo arm. Do not use the tapered washer when installing the ball link.
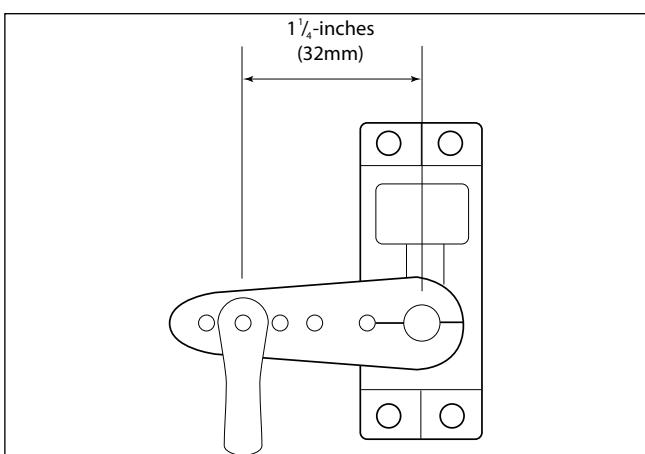
☐☐ Step 6

With the radio system still on, install the 2-inch (51mm) control turnbuckle between the control horn and ball link. Thread the turnbuckle until the aileron is centered while the aileron servo is centered.

Hint: A Pro-Link Wrench (HAN3558) is available to use in adjusting the linkages and makes adjustments much easier.

☐ Step 7

Repeat Steps 1 through 6 to install the remaining aileron servo and linkage.

Rudder and Rudder Servo Installation

Required Parts

- Fuselage
- Rudder hinge wire
- Rudder tiller
- #4 washer (2)
- Rudder control cable
- Threaded cable end (4)
- Rudder
- Control horn (2)
- Tail gear assembly
- Steering spring (2)
- Cable crimp (4)
- Servo
- 4-40 x 1/2-inch socket head screw (2)
- #6 x 5/8-inch socket head sheet metal screw (2)

Required Tools and Adhesives

- Felt-tipped pen
- Drill bit: 5/64-inch (2mm)
- Crimping tool
- Double Side Aluminum Adjustable Spline Servo Arm
- Drill
- Thin CA

☐ Step 1

Start the rudder installation by inserting the rudder hinge wire into the bottom hinge.
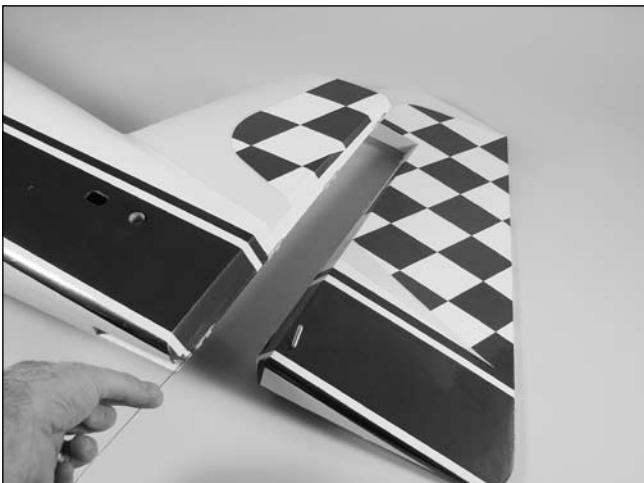
Hint: Sharpening the end of the hinge wire will help center it in the hinges and make installation easier.

☐ Step 2

Place the rudder in position against the fuselage. Use a drill when installing the hinge, as it will help guide the hinge wire through the hinges.
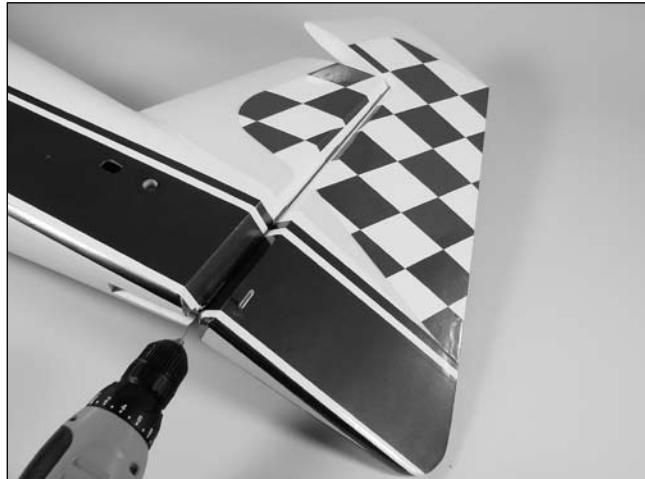

☐ Step 3

Thread the control horn onto the threaded rod. The distance between the rudder and the bottom of the horn is 21/32-inch (16.5mm).

21/32-inch (16.5mm)
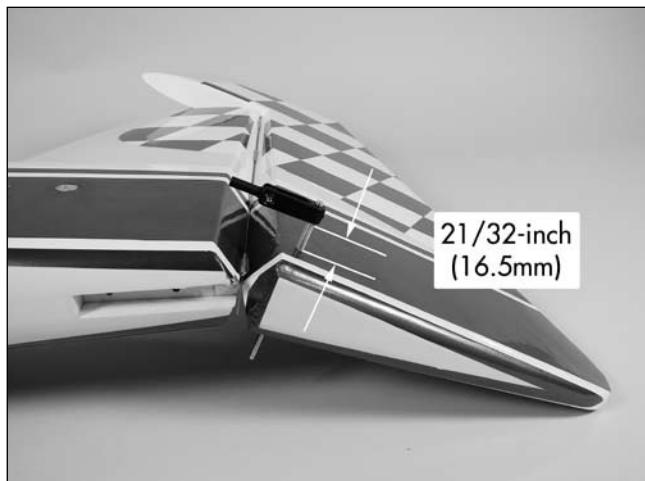
Note: Make sure to install a control horn on both sides of the rudder to connect the pull-pull rudder controls.

☐ Step 4

Hold the tail wheel tiller arm on the bottom of the rudder. With the tiller as far forward as possible, use a felt-tipped pen to mark the positions for the two mounting screws on the bottom of the rudder.
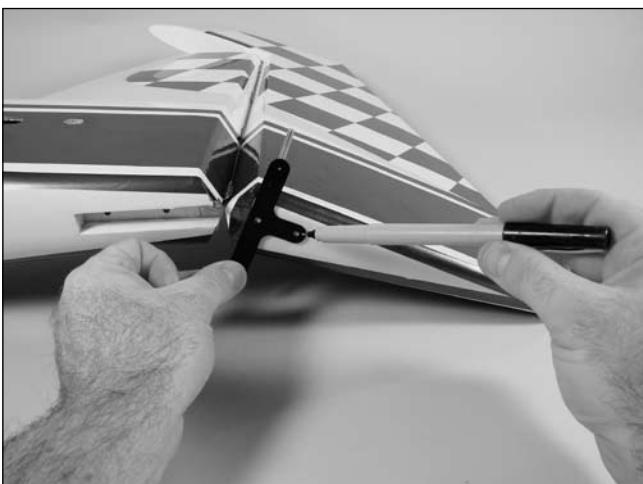
☐ Step 5

Use a drill and 5/64-inch (2mm) drill bit to drill the two holes for the tiller mounting screws.

☐ Step 6

Apply a few drops of foam-safe CA into each hole to harden the surrounding wood.

☐ Step 7

Attach the rudder tiller to the bottom of the rudder using two #6 x 5/8-inch socket head sheet metal screws.

☐ Step 8

Attach the tail gear to the fuselage using two 4-40 x 1/2-inch socket head screws and two #4 washers.

Important: Make sure to use threadlock on the screws to prevent them from vibrating loose.

☐ Step 9

Connect the steering arm on the tail wheel assembly to the tail wheel tiller arm with the two steering springs. Thread a cable end 14 turns into the ball link on the conrtol horn.
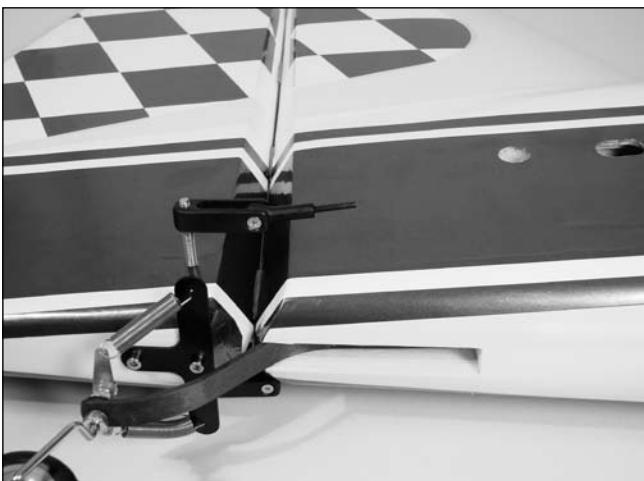
Note: If you plan on using a rear mounted rudder servo, you can skip to the next section of the manual.

☐ Step 10

Use a hobby knife to remove the covering from the openings for the rudder control cables.

☐☐ Step 11

Cut the rudder cable into two equal length pieces. Slide a crimp onto the cable, the pass the cable through the threaded cable end. Pass the cable back into the crimp and use crimping pliers to secure the crimp to the cable. Guide the cable into the fuselage to the position for the rudder servo.

Hint: If you have an old pushrod tube in your possession, you can slide the tube into the fuselage, then slide the cable through the tube. Guiding the tube through the structure inside the fuselage is much easier than guiding the cable only.

☐ Step 12

Prepare two ball ends by threading a cable end into each of the ball ends as shown.

☐ Step 13

Center the rudder servo using the radio and install the control horn. Attach the ball ends to the rudder servo arm (1 $\frac{1}{2}$-inches or 38mm from the center of the servo arm) as shown. Do not use the tapered washers when installing the ball ends.

1$\frac{1}{2}$-inches (38mm)
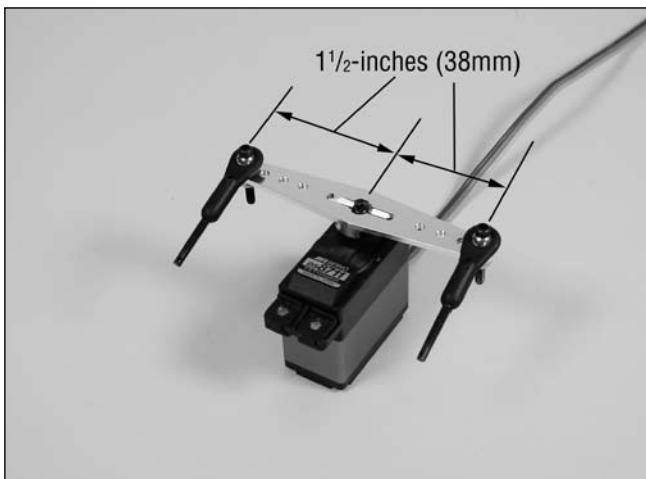
☐ Step 14

Install the rudder servo in the fuselage with the output of the servo facing to the front.
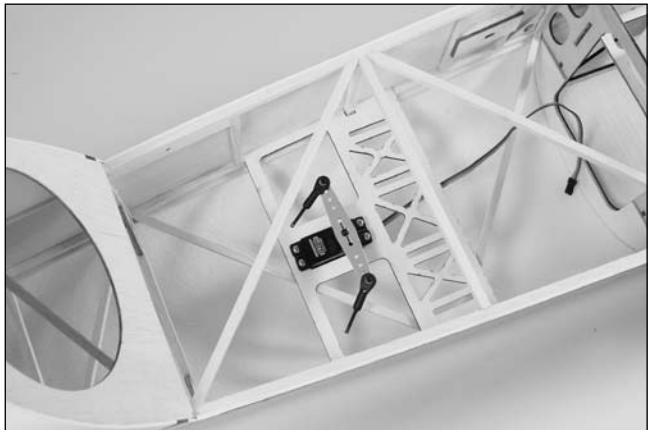
Hint: Use a pin drill and 1/16-inch (1.5mm) drill bit to predrill the holes for the servo mounting screws. This will prevent the wood from splitting when installing the servo. Apply 2–3 drop of foam-safe CA into each hole to harden the surrounding wood. This will make the screws more secure and prevent them from vibrating loose.

☐ Step 15

Repeat Step 11 to attach the cable to the rudder servo. There should be light tension on each of the wires when installed properly.

Note: The rudder cables will cross inside the fuselage as shown. This provides the correct geometry for the operation of the rudder.

Tail Mounted Servo Installation

Required Parts

- Fuselage
- Pro-Link
- Servo
- Ball end w/hardware

Required Tools and Adhesives

- $1\frac{1}{2}$-inch Single Side Alum Adj. Spline Servo Arm

☐ **Step 1**

A servo can be mounted in the rear of the fuselage when using heavier engine options. You will need to remove the covering for the servo and mount the servo using the hardware provided with the servo. Use the longer Pro-Link™ to connect the servo to the control horn as shown in the image below.
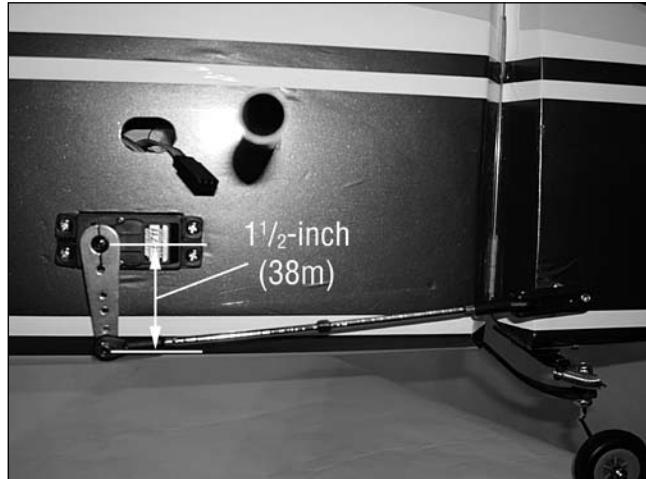
# Stabilizer Servo and Installation

Required Parts

- Stabilizer assembly (left and right)
- Control horn (2)
- Stabilizer tube
- #4 washer (4)
- #4 lock washer (4)
- 4-40 x 1/2-inch socket head screw (2)
- 4-40 x 1-inch socket head screw (2)
- Ball link w/hardware (2)
- Pro-Link, 2-inch (51mm) (2)

Required Tools and Adhesives

- Ruler
- Servo w/hardware (2)
- Adjustable wrench
- $1\frac{1}{2}$-inch Single Side Alum Adj. Spline Servo Arm (2)
- Pro-Link wrench (optional)

☐☐ **Step 1**

Use the servo hardware to mount the elevator servo in the stabilizer. The output shaft of the servo will face away from the control horn. Use the radio system to center the elevator servo. Install the servo arm on the servo so it is parallel to the elevator hinge line.
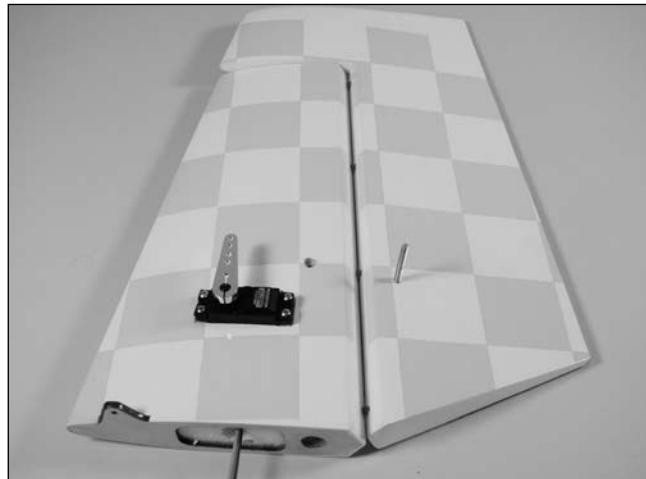
Hint: Use a pin drill and 1/16-inch (1.5mm) drill bit to predrill the holes for the servo mounting screws. This will prevent the wood from splitting when installing the servo. Apply 2–3 drop of foam-safe CA into each hole to harden the surrounding wood. This will make the screws more secure and prevent them from vibrating loose. Be careful not to use too much CA which can eat the underlying foam.

☐☐ Step 2

Thread the control horn onto the threaded rod. The distance between the elevator and the bottom of the horn is 21/32-inch (16.5mm).
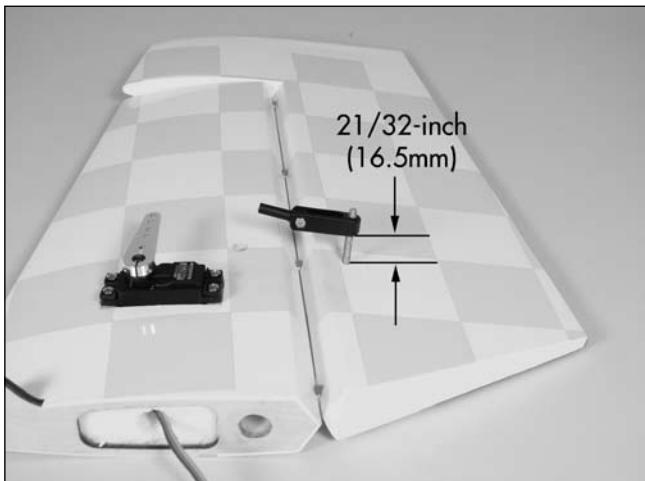
☐☐ Step 3

Attach the ball end to the elevator servo arm $1\frac{1}{4}$-inches (32mm) from the center of the servo arm as shown. Do not use the tapered washers when installing the ball end.
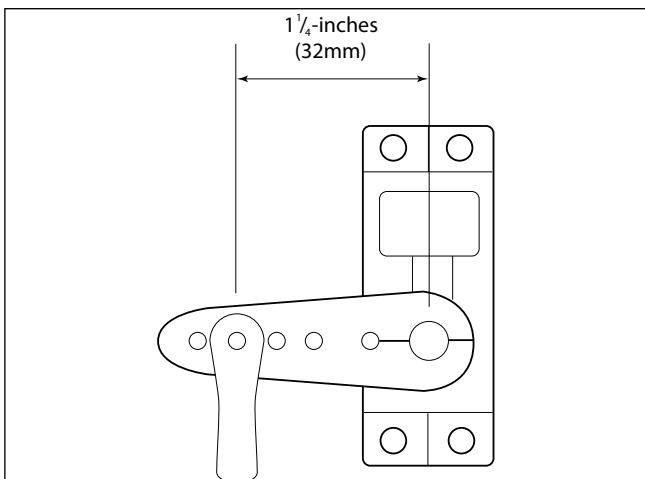
☐☐ Step 4

With the radio system still on, install the 2-inch (51mm) control turnbuckle between the control horn and ball link. Thread the turnbuckle until the elevator is centered while the elevator servo is centered.

Hint: A Pro-Link Wrench (HAN3558) is available to use in adjusting the linkages and makes adjustments much easier.

☐ Step 5

Repeat Steps 1 through 4 to install the remaining elevator servo and linkage.

☐☐ Step 6

Slide the stabilizer tube into the stabilizer. Secure the tube using a 4-40 x 1/2-inch socket head screw, a #4 washer and #4 lock washer.
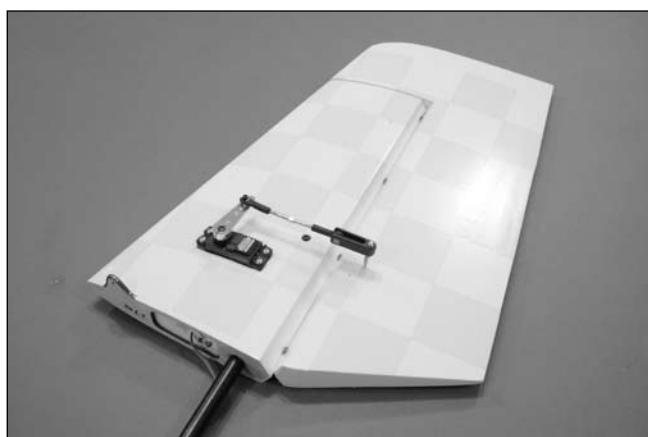
Important: Make sure to use threadlock on the screws to prevent them from vibrating loose.

☐☐ Step 7

Secure a 24-inch (610mm) servo extension to the elevator servo. Slide the tube into the fuselage while guiding the extension into the fuselage toward the radio area.

☐☐ Step 8

Use a 4-40 x 1-inch socket head screw, #4 washer and #4 lock washer to secure the stabilizer to the fuselage.

Important: Make sure to use threadlock on the screws to prevent them from vibrating loose.

☐ Step 9

Repeat Steps 7, 8 and 6 in that order to install the remaining stabilizer in position.

Landing Gear Installation

Required Parts

- Fuselage
- Landing gear
- Axles w/nut (2)
- #8 lock washer (4)
- #8 washer (4)
- #4 washer (4)
- 4-40 blind nut (4)
- Wheel (2)
- Wheel pant (left and right)
- 5-32 wheel collar w/setscrew (4)
- 4-40 x 1/2-inch socket head screw (4)
- 8-32 x 1 $^1/_4$-inch socket head screw (4)

Required Tools and Adhesives

- Adjustable wrench (2)
- Flat screwdriver
- Threadlock
- Drill
- Drill bit: 1/8-inch (3mm)
- Felt-tipped pen
- Threadlock

□ Step 1

Attach the landing gear axles to the landing gear using two adjustable wrenches.

□ Step 2

Remove the landing gear fairing from the bottom of the fuselage.

□ Step 3

Attach the landing gear to the fuselage using four 8-32 x 1 $^1/_4$-inch socket head screws, four #8 washers and four #8 lock washers.

Note: The landing gear attachment is designed so that the hardwood runners are tapped for the 8-32 bolts and no nuts are needed. This is an excellent design feature used on all Carden Aircraft models that allows the threads to fail, letting the landing gear pull away from the fuselage without causing excessive structural damage if a severe landing should happen. If this should happen, simply drill and tap the holes in the hardwood runners for 10-32 bolts and reattach the landing gear.

☐ **Step 5**

Place the landing gear fairing back onto the fuselage and secure it using the screws removed in Step 2.

☐☐ **Step 6**

Use a flat file to file a flat area on the bottom of the axle. This provides an area for the setscrews to bite and reduces the chance of losing a wheel during flight.
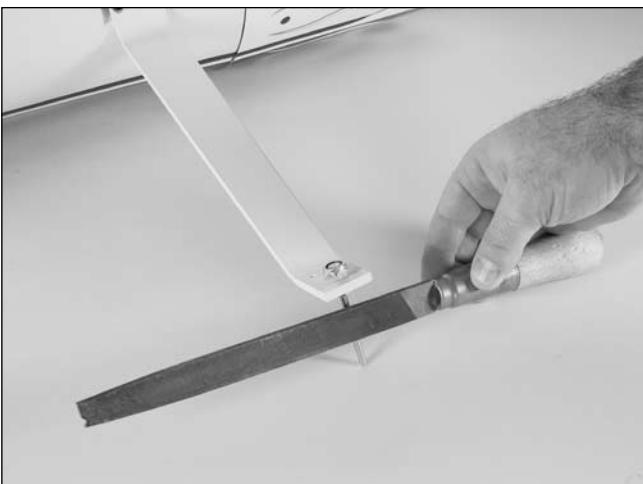
☐☐ **Step 7**

Attach the wheels to the landing gear using two 5/32-inch wheel collars and two setscrews for each wheel. The wheel collars are positioned on either side of the wheel.

☐☐ **Step 8**

Position the wheel pant over the wheel. Align the centerline of the wheel pant with the top edge of the fuselage as shown.

Align
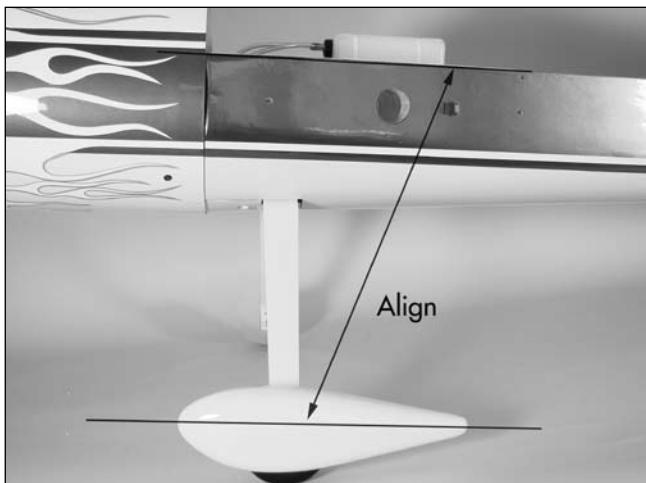
☐☐ **Step 9**

Use a felt-tipped pen to transfer the position for the two mounting screws onto the wheel pant.

☐☐ **Step 10**

Use a drill and 1/8-inch (3mm) drill bit to drill the two holes to install the 4-40 blind nuts inside the wheel pant.

☐☐ **Step 11**

Install two 4-40 blind nuts inside the wheel pant.

☐☐ **Step 12**

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

Important: Make sure to use threadlock on the screws to prevent them from vibrating loose.

☐☐ Step 13

Loosen the setscrews and position the wheel in the center of the opening of the wheel pant. Tighten the setscrews to secure the position of the wheel.

Important: Make sure to use threadlock on the setscrews to prevent them from vibrating loose.

☐ Step 14

Repeat Steps 6 through 13 to install the remaining wheel pant.

Engine Installation

Required Parts

- Fuselage
- Ball link (2)
- 1/4-20 socket head bolt (4)
- 1/4-inch split washer (4)
- Throttle pushrod

Required Tools and Adhesives

- Medium CA
- Drill
- Drill bit: 1/4-inch (6mm)
- Ruler
- Square
- Hobby knife
- Razor saw
- Rotary tool

Note: The DA-50 can be used with either the MTW 75 canister and header exhaust system, or with the Slimline Pitts muffler, both available from Desert Aircraft. This section shows installation of the DA-50 using the MTW canister muffler system.

☐ Step 1

Attach the 3-inch standoffs onto the engine using the instructions provided with the engine. Also collect all the items required for the exhaust system at this time.

☐ Step 2

Refer to the engine centerline marked on the firewall and center your engine on these marks. Measure the distance between the standoff mounts, both horizontal and vertical. Take the measurement and divide it by two. Use this measurement to mark the positions above and below and to each side of the centerlines for the engine mount. Use a drill and a 1/4-inch drill bit to drill four holes at the marked locations. Also drill a hole for the fuel line and throttle linkages.
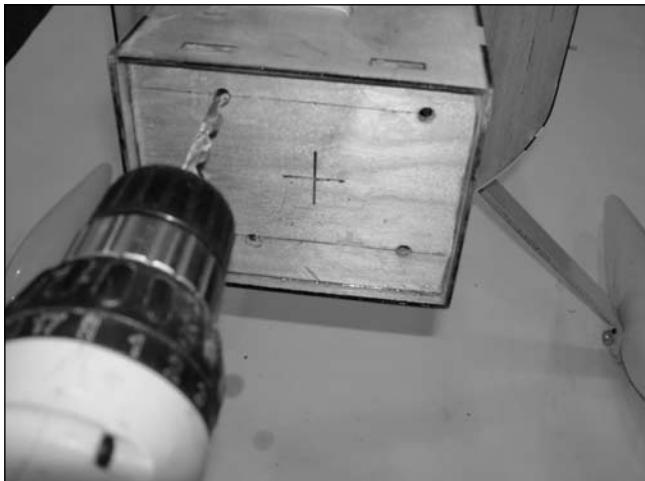

☐ Step 3

Measure and mark the center of each of the two engine mounting blocks. Then measure the same distance to each side of the center as done on each side of the firewall and drill a 1/4-inch hole at each of these marks. Also drill a hole through the block to be positioned at the top for the throttle linkage if needed.
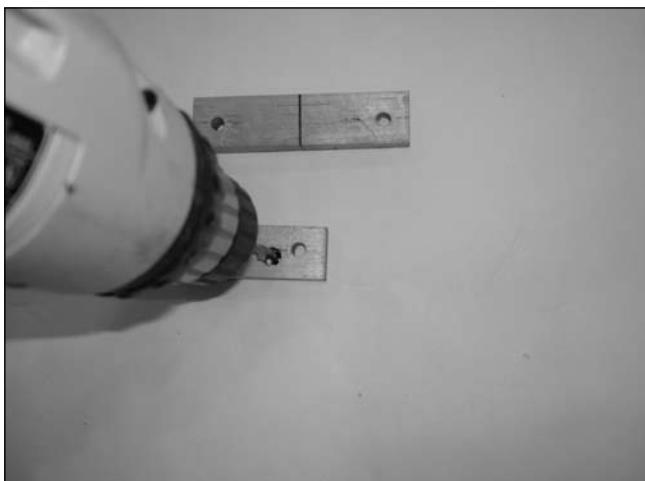
☐ Step 4

Attach the engine to the firewall using four 1/4-20 bolts and four 1/4-inch split washers from the inside of the firewall. Position the engine mounting blocks behind the engine with the thin side positioned toward the right side of the fuselage as viewed sitting in the cockpit.

> **Note**: Skip to Step 10 if using a Pitts-style muffler, as the following modifications are only required when using a canister-style muffler.


Thin side of mounting blocks
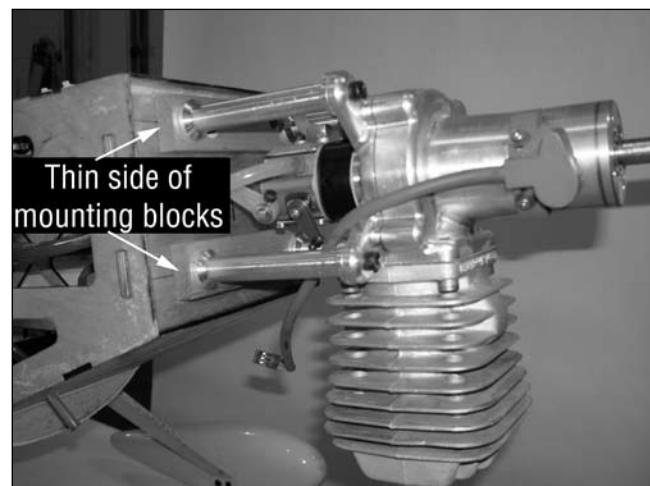
☐ Step 5

Remove the marked area under the engine box with a hobby knife or rotary tool. It may be necessary to alter the shape of the opening to fit the particular canister and header being used.

☐ **Step 6**

Cut an oval-shaped opening in the bottom of the fuselage behind the fuel tank. Use a covering iron to seal the UltraCote into the fuselage. Remember to seal the wood inside the fuselage to protect it from fuel and exhaust.
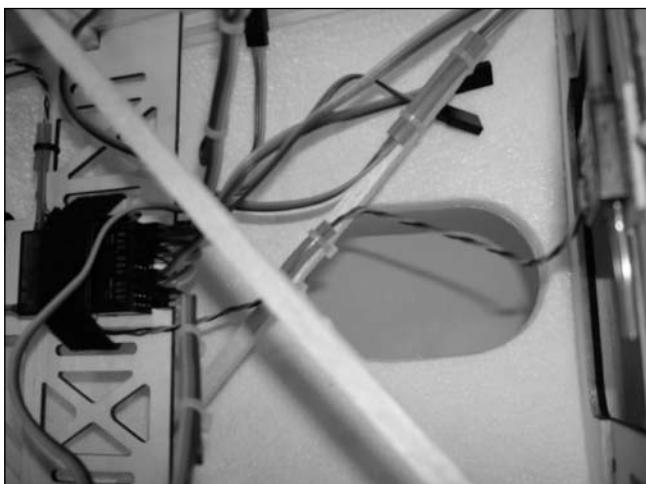
Note: Early versions of the DA-50 were produced with the carbuerator rotated 180 degrees from the later versions. Since both versions exist, photos with the canister are shown with one version and photos showing the in-cowl muffler show the other version. Either are fine. Route the fuel line and throttle linkage accordingly.

☐ **Step 7**

Install the supplied canister mount into the area in front of the fuel tank. Assemble the canister and header using the coupler and clamps provided with the muffler. The header may need to be cut shorter so the exhaust from the canister is positioned in front of the forward fuselage former. Remove the engine and slide the muffler into the opening made in bottom of the engine box and through the canister mount inside the fuselage. Then reinstall the engine and bolt the exhaust header to the engine.
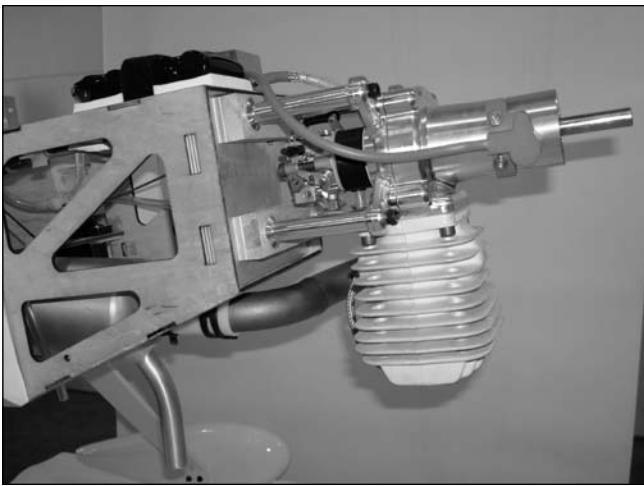
☐ Step 8

Position the exhaust stinger directly down so the exhaust exits the aircraft. Bolt the exhaust header to the engine.

☐ Step 9

Screw the canister mount in place with four wood screws.

☐ Step 10

Cut out the cowling as shown to clear the exhaust and spark plug cap.

☐ Step 11

If using a Pitts-style muffler, mount the muffler to the engine at this time.
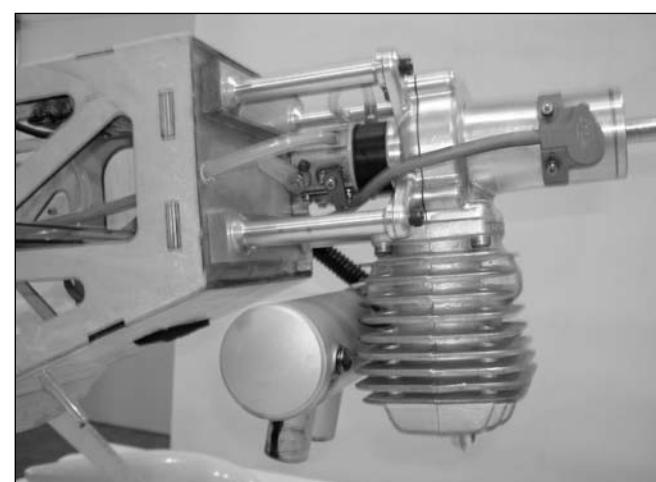
☐ Step 12

Glue the throttle servo mount in place. Position the throttle servo toward the side of the fuselage that is appropriate for the engine being used. Thread a 2mm ball link onto each end of the throttle pushrod. Attach the clevis to the carburetor arm and the servo arms.

Hint: Add thin CA around cowl ring screw hole to harden plywood cowl ring to avoid drawing in the cowl and chafing the fuselage covering when tightening this screw. A small gap should exist between the cowl and the face of the fuselage. Should the gap decrease to a point where the cowl begins to rub then add a small washer to act as a spacer.

☐ Step 13

Install the ignition and ignition battery onto the engine box as shown. Mounting the ignition to the engine box keeps adequate separation from the receiver. Being too near could cause radio interference with some radio systems.

Radio Installation

Required Parts

- Fuselage
- Switch (3)
- 8-32 x 1 $\frac{1}{4}$-inch socket head screw (4)

Required Tools and Adhesives

- Drill
- Hobby knife
- Drill bit: 1/2-inch (13mm)

☐ Step 1

Drill a 1/2-inch (13mm) hole in the fuselage to mount the fuel dot to the side of the fuselage.

Note: Be sure to provide clearance for wing before drilling the fuel dot hole.

☐ Step 2

Mount the switch for the ignition toward the front of the fuselage as shown.

☐ Step 3

Secure the radio battery inside the fuselage.

☐ Step 4

Place a piece of foam between the radio tray and receiver and secure it inside the fuselage. Make the connections from the rudder, elevator and throttle servos, as well as the aileron extensions. Mount the radio switch on the side of the fuselage.
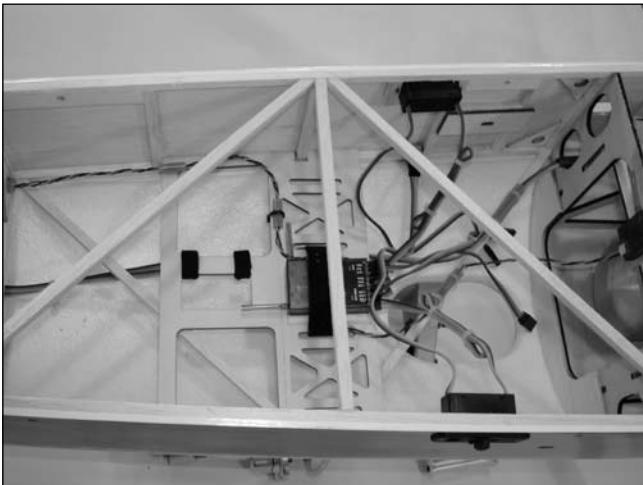
Note: Make sure to secure all the leads so they do not vibrate or cause radio interference.

☐ Step 5

Using double-sided foam tape, (servo tape) mount the remote receiver(s) keeping the remote antenna(s) at least 2 inches away from the primary antenna. Ideally the antennas will be oriented perpendicular to each other; however, we've found this to not be critical. 6-inch, 9-inch, 12-inch, 24-inch and 36-inch leads are available and in sophisticated aircraft, we've found it best to mount the remote receivers in different parts of the aircraft keeping the remote antennas as far away as practical from any conductive materials. A typical installation would include the main receiver mounted in the conventional location in the fuselage and the remote antennas in the nose, in the top turtle deck and even in the tail. The optimum location is as far away from any conductive materials as practical.

> **Important**: When using remote receiver(s), mounting the remote receiver(s) in a different location(s), from the primary receiver, gives tremendous improvements in signal reception. Essentially each receiver sees a different RF environment and this is the key to maintaining a solid RF link.

Pilot and Canopy Installation

Required Parts

- Fuselage
- Instrument panel decal
- Canopy hatch
- Pilot figure
- Canopy

Required Tools and Adhesives

- Hobby knife
- Phillips screwdriver: #1
- Rubbing alcohol
- 30-minute epoxy
- Canopy glue
- Sandpaper
- Paper towel
- Painter's tape

☐ Step 1

Use a hobby knife to trim the instrument panels from the decal sheet. Note there is a front and rear instrument panel decal.
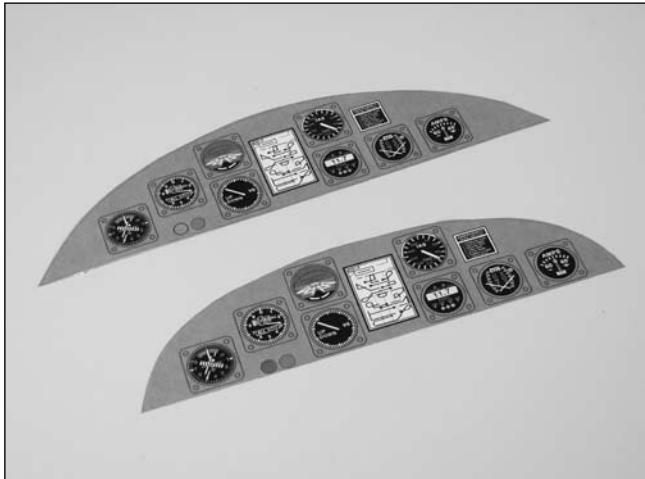
☐ Step 2

Remove the backing and secure the instrument panels into position in the canopy hatch.

☐ Step 3

Remove a section of the covering from the canopy hatch from under where the pilot will sit. Use 30-minute epoxy to secure the pilot in the cockpit.
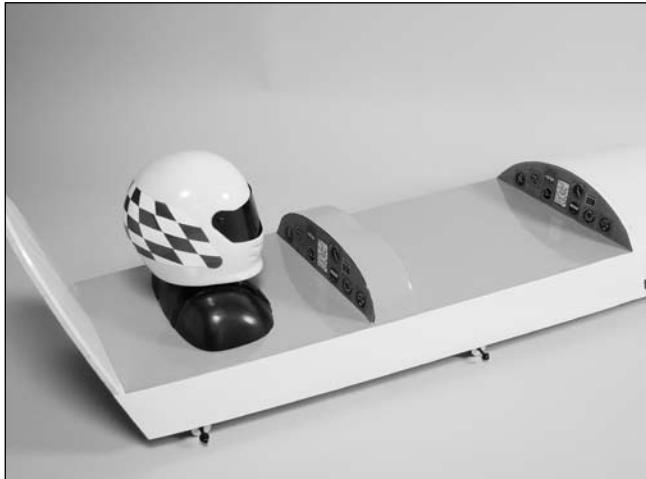
☐ Step 4

Once the epoxy has fully cured, check that the screws holding the visor of the pilot are tight.
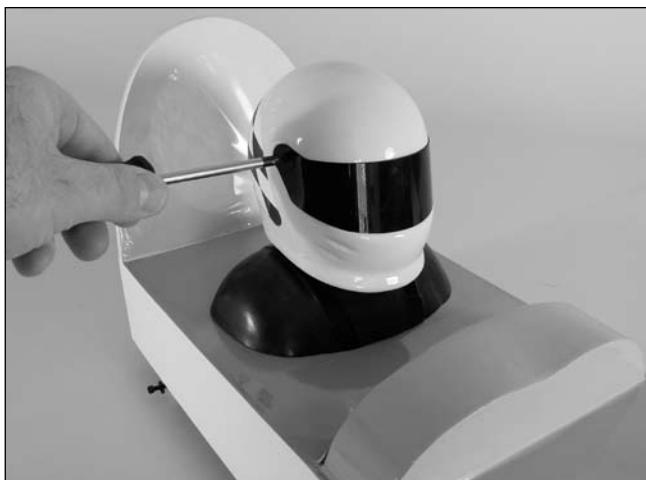
☐ Step 5

Use 400-grit sandpaper to lightly scuff the edges of the canopy hatch and canopy where they will contact each other. Use a paper towel and rubbing alcohol to remove any residue or debris from both items.
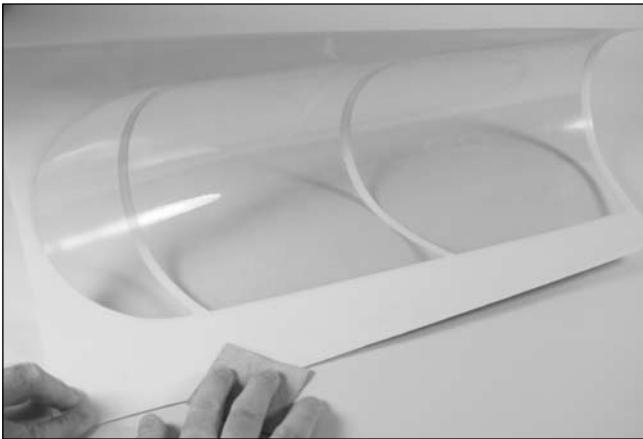
☐ Step 6

Tape a piece of plastic or waxed paper at the rear and align the bottom of the fuselage. This will prevent gluing the canopy hatch to the fuselage.
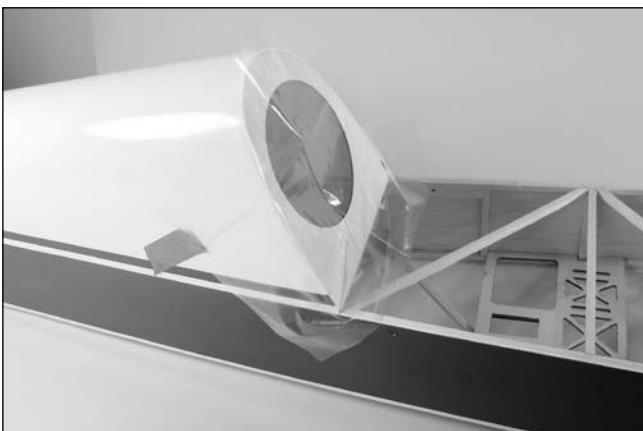
☐ Step 7

Secure the canopy hatch to the fuselage.

☐ Step 8

Use canopy glue to attach the canopy to the canopy hatch. Use painter's tape to hold the canopy in position until the glue fully cures.

Control Throws

Setting the control throws for your YAK 54 does require some attention to detail. To correctly set the throws, it is highly suggested to use the following procedure to achieve the greatest mechanical advantage from your servos.

☐ Step 1

Determine the maximum amount of control surface throw from the throws listed. Use the high rate throws listed to set the maximum amount of throw, then use your computer radio for the lower rate listed.

☐ Step 2

Set the Travel Adjust (ATV on a Futaba transmitter) to about 15% under the max. (On a JR transmitter, that is 135%.) Make sure to set both directions during this process.

☐ Step 3

Adjust the position of the clevis on the control horn and position of the ball link on the servo arm to achieve the throw decided in Step 1. It is highly recommended not to use longer servo arms or shorten the length of the control horns at the surfaces. Also, do not change the position on the servo arm unless absolutely necessary. Use Travel Adjust (ATV) to finalize the throws. That is why we left a little margin in the percentages back in Step 2.

☐ Step 4

If setting a dual elevator or aileron, match the linkage locations used back in Step 3. Increase or decrease the Travel Adjust (ATV) a few points as necessary to fine-tune the throws to match up left and right sides and up and down throws so all is symmetrical.

This is necessary to ensure that the mechanical advantage is as great as possible. When setting up the Yak, or any model for 3D aerobatics, mechanical advantage is lower in order to get the large control surface deflections needed. This will cause faster servo wear. Using an insufficient servo for the job, or trying to get more surface deflection by changing the mechanics of the linkage will cause something to give, probably the servo.

There isn't an exact geometry to the linkage, as it depends on how much throw each individual modeler requires. The linkage geometry should always be maximized so the servo isn't working any harder than it has to.

Aileron:

High Rate: 36 Degrees up, 55% Exponential
             36 Degrees down, 55% Exponential
Low Rate: 21 Degrees up, 40% Exponential
             21 Degrees down, 40% Exponential

Elevator:

High Rate: 40 Degrees up, 70% Exponential
             40 Degrees down, 70% Exponential
Low Rate: 11.5 Degrees up, 40% Exponential
             11 Degrees down, 40% Exponential

Rudder:

High Rate: 38 Degrees right, 45% Exponential
             38 Degrees left, 45% Exponential
Low Rate: 23 Degrees right, 40% Exponential
             23 Degrees left, 40% Exponential

Computer Radio Enhancements

A computer radio will allow you to do quite a bit of fine-tuning to the feel of the YAK 54, which will make aerobatics even easier.

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 your model is at the center of the wing tube. The correct measurement for this is $7\,^{17}/_{32}$-inch (191mm) measured back from the leading edge of the wing at the root rib. Mark the location of the CG onto the bottom of the wing using a felt-tipped pen. With a helper, lift the aircraft with your index finger at the location marked on the wing. If the nose of your aircraft hangs low, add weight to the rear of the aircraft. If the tail hangs low, add weight to the nose of the aircraft. Stick-on weights are available at your local hobby store and work well for this purpose.

The center of gravity can also be measured at the wing tip by measureing forward of the hinge line $3\,^{3}/_{4}$-inch (95mm) The Center of Gravity range for your model is range $7\,^{9}/_{32}$-inch to $7\,^{25}/_{32}$-inch (185mm–197mm) when measured at the root, or $3\,^{1}/_{2}$-inch to 4-inch (89mm–102mm) when measured at the wing tip.

$3\,^{3}/_{4}$-inch (95mm)

$7\,^{17}/_{32}$-inch (191mm)
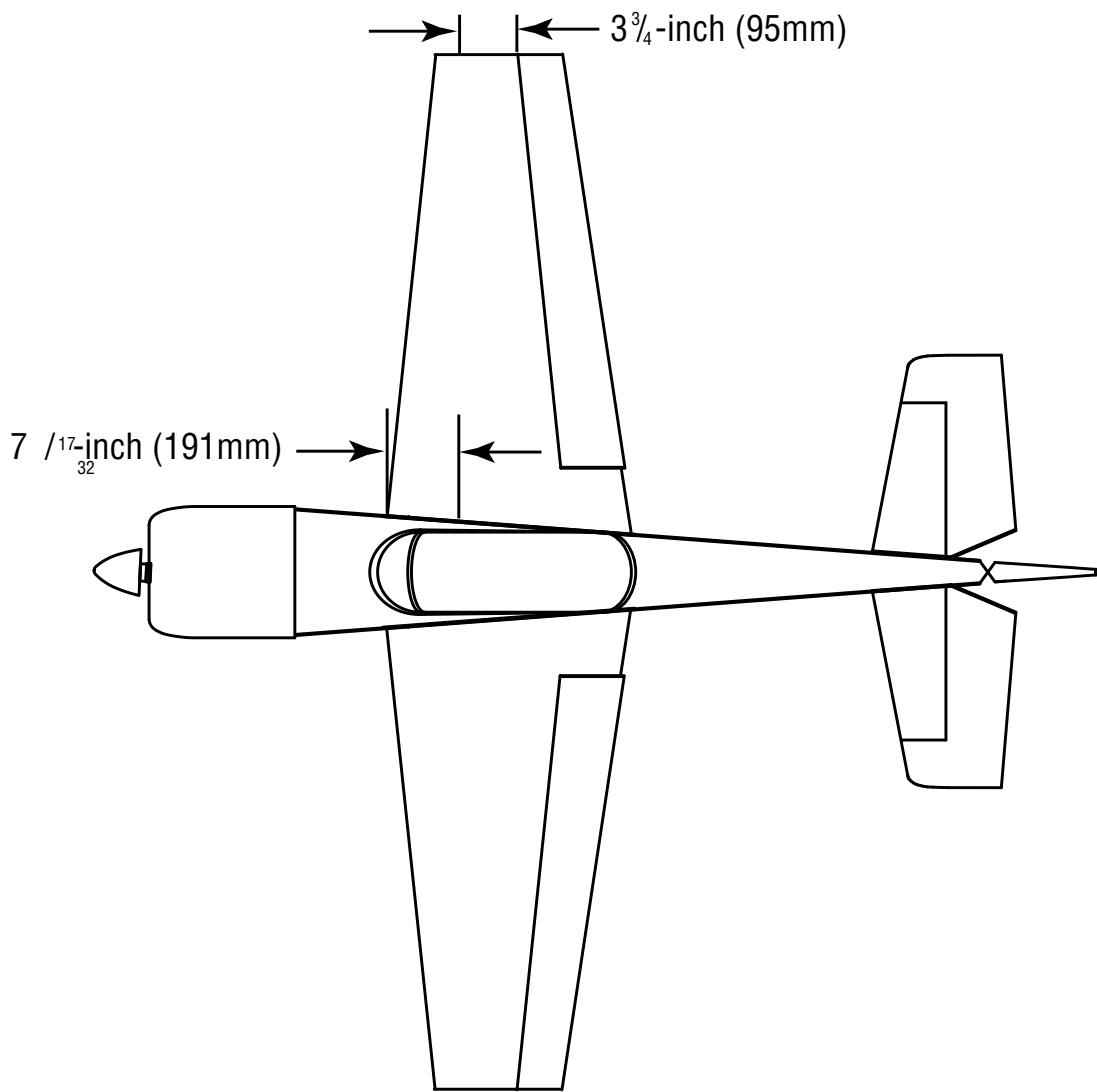
Rates and Expos

Use Expo to soften the feel of the model. On high 3D rates, use quite a bit of expo. The goal on 3D rates is to get the model to feel the same around neutral as it does on low rates.

Use low rate settings for all flying except for 3D aerobatics. For precision flying or general sport hot-dogging, the low rate throws are perfect, even for snap rolls. The only exception is rudder rates. Use 3D rudder rate when doing stall turns and rolling circles, since the more rudder the better for these. When doing 3D aerobatics, flip to 3D rates just before the maneuver. As soon as the maneuver is done, flip back down to low rate to avoid over-controlling the model.

Radio Setup

A 7-channel or greater computer radio is highly recommended. This allows the following features:
- Mixing the right aileron to the left aileron (flaperon mix)
- Electronically adjustable aileron differential
- Mixing the right elevator to the left elevator (dual elevator mixing)
- Independent travel and trim adjustments for each elevator half

When using a 7-Channel or greater computer radio, each servo is plugged into its own separate channel. Consult your radio manual for specific details on hookup and programming.

Preflight

For those of you who are veterans of large models, this is old news. But to you newcomers to the world of large models, this is very important information.

Maintain the proper mechanical advantage on all control surface linkages.

Just as with unsealed hinge gaps, mechanical advantage is often another cause of flutter. Please follow the control horn and servo arm lengths recommended in this manual. Shorter arms on the servo or longer control horns on the elevator and ailerons are fine, but do not try to go the other way to increase throw. It can cause flutter or servo failure on the YAK 54. The recommended linkage setups are more than adequate to achieve full 3D throws.

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.

While many smaller models are very tolerant of improper control linkage setups and flying techniques, large models are not. Don't let that scare you away from large models; they are truly one of the best flying experiences in RC that money can buy. However, please pay particular attention to the following areas.

Never attempt to make full throttle dives!

Large models perform much more like full-size aircraft than small models. If the airframe goes too fast, such as in a high throttle dive, it may fail. The YAK 54 should be flown like a full-scale YAK 54. Throttle management is absolutely necessary.

Hardware checks

Double-check the setscrews in all contol horns to be sure they are very tight. Periodically check these to be sure they have not loosened over time. Always use threadlock on metal-to-metal fasteners.

Receiver Battery Selection

Be sure adequate batteries are used to power the receiver. It is STRONGLY recommended that a 6-volt receiver pack is used. It must have a minimun of 2700mAh capacity.

Servo selection

Be sure all servos used on elevator, aileron and rudder are metal geared type and have at least 188 oz/in of torque. Failure to do this will very likely result in a failure and loss of the model.

Range check

Always range check the radio system per the manufacturer's instructions before the initial test flight and periodically afterward.

Check the voltage of the on-board packs

ALWAYS use an ESV with a 1-amp load to check the receiver battery pack and the ignition pack before each and every flight. If there is any doubt that the packs are questionable, DO NOT FLY until the packs are recharged.

Instructions for Disposal of WEEE by Users in the European Union

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.

2008 Official AMA
National Model Aircraft Safety Code

GENERAL

1. A model aircraft shall be defined as a non-human-carrying device capable of sustained flight in the atmosphere. It shall not exceed limitations established in this code and is intended to be used exclusively for recreational or competition activity.

2. The maximum takeoff weight of a model aircraft, including fuel, is 55 pounds, except for those flown under the AMA Experimental Aircraft Rules.

3. I will abide by this Safety Code and all rules established for the flying site I use. I will not willfully fly my model aircraft in a reckless and/or dangerous manner.

4. I will not fly my model aircraft in sanctioned events, air shows, or model demonstrations until it has been proven airworthy.

5. I will not fly my model aircraft higher than approximately 400 feet above ground level, when within three (3) miles of an airport without notifying the airport operator. I will yield the right-of-way and avoid flying in the proximity of full-scale aircraft, utilizing a spotter when appropriate.

6. I will not fly my model aircraft unless it is identified with my name and address, or AMA number, inside or affixed to the outside of the model aircraft. This does not apply to model aircraft flown indoors.

7. I will not operate model aircraft with metal-blade propellers or with gaseous boosts (other than air), nor will I operate model aircraft with fuels containing tetranitromethane or hydrazine.

8. I will not operate model aircraft carrying pyrotechnic devices which explode burn, or propel a projectile of any kind. Exceptions include Free Flight fuses or devices that burn producing smoke and are securely attached to the model aircraft during flight. Rocket motors up to a G-series size may be used, provided they remain firmly attached to the model aircraft during flight. Model rockets may be flown in accordance with the National Model Rocketry Safety Code; however, they may not be launched from model aircraft. Officially designated AMAAir Show Teams (AST) are authorized to use devices and practices as defined within the Air Show Advisory Committee Document.

9. I will not operate my model aircraft while under the influence of alcohol or within eight (8) hours of having consumed alcohol.

10. I will not operate my model aircraft while using any drug which could adversely affect my ability to safely control my model aircraft.

11. Children under six (6) years old are only allowed on a flightline or in a flight area as a pilot or while under flight instruction.

12. When and where required by rule, helmets must be properly worn and fastened. They must be OSHA, DOT, ANSI, SNELL or NOCSAE approved or comply with comparable standards.

2008 Official AMA
National Model Aircraft Safety Code

Radio Control

1. All model flying shall be conducted in a manner to avoid over flight of unprotected people.

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

3. I will not fly my model aircraft in the presence of spectators until I become a proficient flier, unless I am assisted by an experienced pilot.

4. At all flying sites a line must be established, in front of which all flying takes place. Only personnel associated with flying the model aircraft are allowed at or in front of the line. In the case of airshows demonstrations straight line must be established. An area away from the line must be maintained for spectators. Intentional flying behind the line is prohibited.

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

6. I will not knowingly operate my model aircraft within three (3) miles of any preexisting flying site without a frequency-management agreement. A frequency-management agreement may be an allocation of frequencies for each site, a day-use agreement between sites, or testing which determines that no interference exists. A frequency-management agreement may exist between two or more AMA chartered clubs, AMA clubs and individual AMA members, or individual AMA members. Frequency-management agreements, including an interference test report if the agreement indicates no interference exists, will be signed by all parties and copies provided to AMA Headquarters.

7. With the exception of events flown under official AMA rules, no powered model may be flown outdoors closer than 25 feet to any individual, except for the pilot and located at the flight line.

8. Under no circumstances may a pilot or other person touch a model aircraft in flight while it is still under power, except to divert it from striking an individual.

9. Radio-controlled night flying is limited to low-performance model aircraft (less than 100 mph). The model aircraft must be equipped with a lighting system which clearly defines the aircraft's attitude and direction at all times.

10. The operator of a radio-controlled model aircraft shall control it during the entire flight, maintaining visual contact without enhancement other than by corrective lenses that are prescribed for the pilot. No model aircraft shall be equipped with devices which allow it to be flown to a selected location which is beyond the visual range of the pilot.

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