

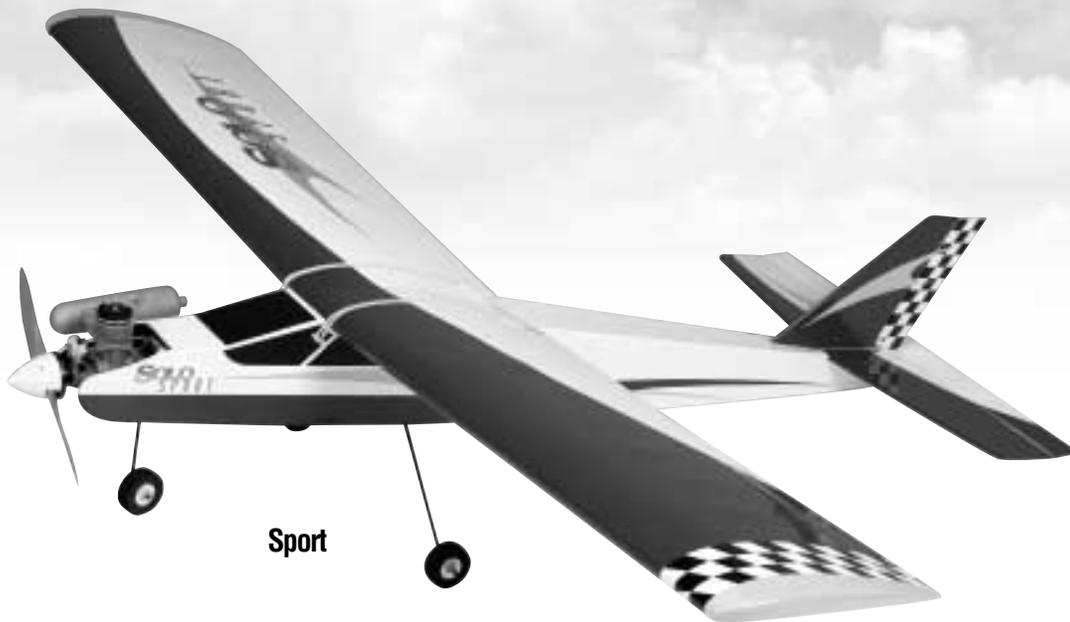
SOLO

COLLECTION

INSTRUCTION MANUAL



- Easy to fly – great for first-time pilots
- Excellent self righting flight characteristics
- 90% pre-built and covered in pre-printed, heat shrinkable PVC
- All hardware included
- Three trim schemes to choose from

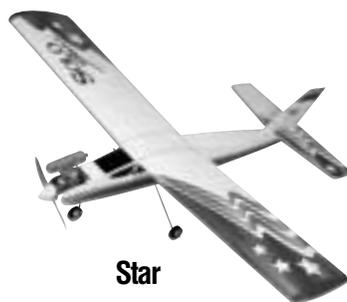


Sport

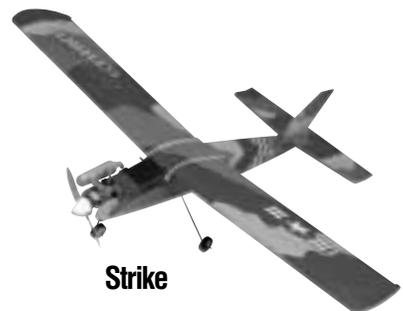


Specifications

Wingspan: 62"
 Length: 45 1/2 sq."
 Wing Area: 720 in.
 Weight (Approx.): 6-6 1/4 lbs.
 Recommended Engines:40 –.48 2-cycle
45 –.56 4-cycle



Star



Strike

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Introduction

Congratulations on your purchase of a Hangar 9 Solo. This trainer aircraft has a choice of unique finishes that will set it apart from the general trainer type of aircraft. It's an ideal trainer, as well as a good choice for a second aircraft for modelers who demand a good looking model that can be built in a few short evenings. This 90% pre-built beauty will get you to the field in no time!

Care has been taken to write a manual that will ensure you achieve the best performance and maximum enjoyment from your Solo aircraft. It is important to carefully read and follow the instructions in this manual prior to flying the Solo.

If this is your first radio control (R/C) aircraft, it would be advisable to seek out an experienced flier to help you with your first flights—you should do this with any R/C aircraft. Your local hobby shop should be able to suggest pilots who can assist you.

Should you have any questions regarding this kit, please contact the Horizon Service Center at 217-355-9511.

WARNING:

An R/C aircraft is not a toy! If misused, it can cause serious bodily harm and damage to property. Fly only in open areas, preferably AMA (Academy of Model Aeronautics) approved flying sites, following all instructions included with your radio and engine.

Special Note: Due to changes in weather, wrinkling of the covering may occur. This is the nature of the covering film of the model aircraft and can be easily smoothed using a heat gun or sealing iron following the directions below:

In case of wrinkle: Use a heat gun or sealing iron on the wrinkled area. Then rub the surface with a soft cloth until the surface is smooth again.

Radio System Set-Up

It's a good idea to begin with charging the radio system first, so that later, in Section 14, you are able to electrically center your servos. Locate your charger and plug your battery pack and transmitter into your charger. Plug the charger into an outlet to begin charging. Follow the instructions for charging as outlined in your owner's manual for your specific radio system.

Additional Equipment Required

4-channel radio (minimum)
4 standard servos
Engine
Standard 450-650 mAh receiver battery pack

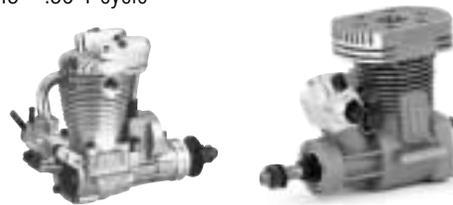
Recommended JR Radio Systems

JR F400 FM
JR F400EX
JR 642 FM
JR XP783
JR XP8103



Engine Requirements:

.40 – .48 2-cycle
.45 – .56 4-cycle



Recommended 2-Cycle Engines

MDS .40
MDS .48
Webra Speed 40GT

Recommended 4-Cycle Engines

Saito .45 – .56
Saito .45 – .56GK

Recommended Propeller

10x6 with a .40 – .48 size engine

Additional Tools and Supplies Required (not supplied)

Adhesives

CA (cyanoacrylate) glue (thick)
6-minute epoxy
30-minute epoxy
Thread Lock (e.g., Blue Locktite 242)

Tools

Drill
Drill bits: 1/16", 5/32"
Phillips screwdrivers
Z-bend pliers
Pliers
Small round file
Razor saw
Moto-Tool with sanding drum
Wax paper
Mixing stick
Epoxy brush
90-degree triangle
File
Medium sandpaper
Masking tape
Straight edge
Measuring device (e.g., ruler, tape measure)
Scissors
Paper towels
Rubbing alcohol
Felt tipped pen
Fuel tubing (9-10") (medium)
Clips (clothespins, binder clips)
Hobby knife with #11 blade
Radio packing foam

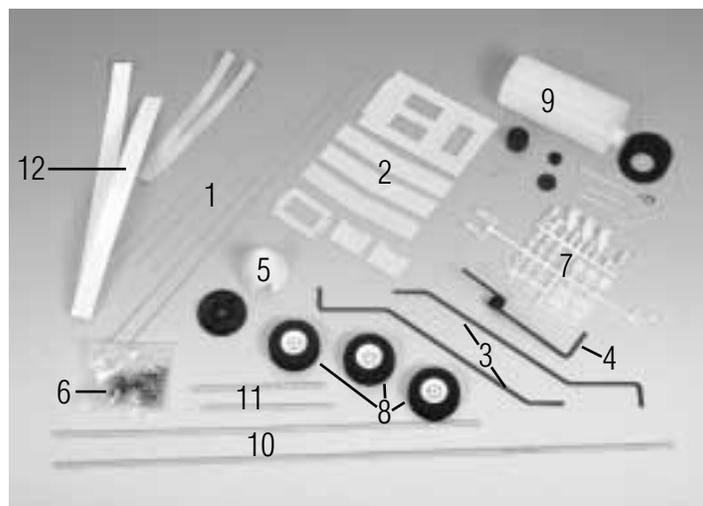
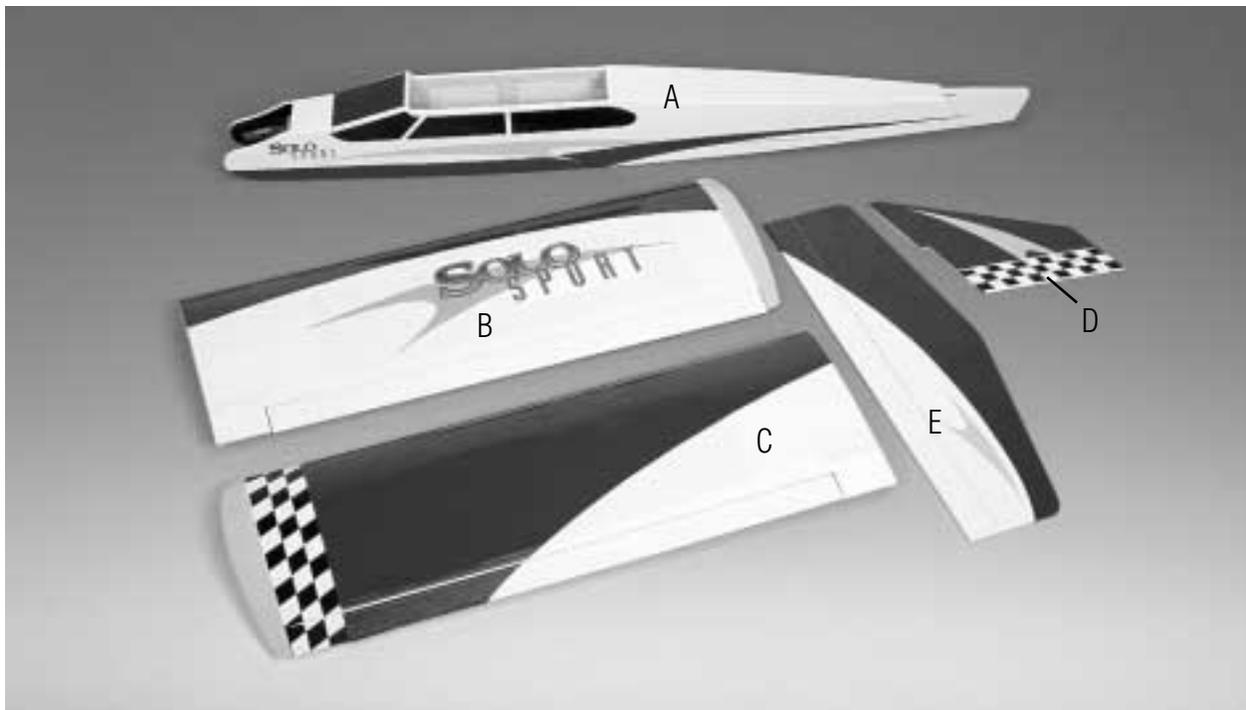
Contents of Kit

Covered Parts

- A. Fuselage
- B. Left wing half with aileron
- C. Right wing half with aileron
- D. Vertical stabilizer with rudder
- E. Horizontal stabilizer with elevator

Others

- 1. Pushrod and Accessories
- 2. 1/8"plywood die-cut parts
- 3. Main landing gear
- 4. Nose landing gear
- 5. Spinner
- 6. Hardware bag
- 7. Plastic parts tree
- 8. Foam wheels
- 9. Fuel tank and hardware
- 10. Wood control dowels
- 11. Wing mounting dowels
- 12. Trim tape



Field Equipment Required



Propeller
MAS1060



Airplane Fuel
HAN3110



Glow Plug Wrench
HAN2510



Glow Plug Igniter with Charger
MCD101



Glow Plug
HAN3000/3005



Manual Fuel Pump
HAN118



#64 Rubber Bands
ARC64



The Hangar 9 Skypack includes everything you need to get your airplane into the air. If you purchase the Skypack, you do not need to purchase the additional materials above (except rubber bands).

Included in the Skypack:

- JR F400EX
- 10x6 propeller
- MDS .40FS engine
- AeroBlend quart, 10%
- Hangar 9 Start Up Field Pack:
 - Flight tote
 - 4-way wrench
 - Glow plug igniter
 - Chicken stick
 - Manual fuel pump
 - Glow plugs

Skypack Pilot Support Package
HAN001

Optional Field Equipment



4-Way Wrench
DUB701



Field Box
HAN130/131



Cleaner & Towels



Extra Glow Plugs
HAN 3000/3005



Misc. Tools



After-Run Fuel
HAN3100



Power Panel
HAN106



12V Sealed Battery
HAN102



12V Starter
HAN104

The HANSTART Start-up Field Pack includes:

- Flight tote
- 4-way wrench
- Glow plug igniter
- Chicken Stick
- Manual fuel pump
- Glow plugs



Start-up Field Pack
HANSTART

Section 1: Assembling the Wings

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Right wing panel with aileron and hinges• Left wing panel with aileron and hinges	<ul style="list-style-type: none">• 30-minute epoxy• Mixing stick/epoxy brush• Paper towels• Rubbing alcohol• Ruler• Wax paper (optional)• Sandpaper, medium

Note: The control surfaces, including the ailerons, elevator and rudder, are pre-hinged with the hinges installed; however, the hinges are **not** glued in place. It is imperative that you properly adhere the hinges and ailerons in place by following the steps below using 30-minute epoxy glue.

1. Carefully remove the aileron from the right wing panel by pulling straight out with even pressure. Note the location of the hinges and the aileron torque rod. This will be of assistance when replacing the aileron onto the wing.

2. Remove all four hinges from the aileron. Flex the hinges at the center line so they move freely. Use sandpaper to slightly roughen the hinge surface so the epoxy will adhere better to the surface.

3. Mix a small amount, approximately 1/4 oz., of 30-minute epoxy. Using either a mixing stick or a small piece of scrap wood, apply the epoxy sparingly inside each hinge slot on the aileron. Additionally, apply a small amount of epoxy to the top and bottom half of each hinge. Insert the hinges into the aileron until the hinge line of the hinge is even with the leading edge of the aileron.

Note: Do **not** apply epoxy into the aileron torque rod hole at this time.



Note: Some kits will have the aileron completely covered. In this case, disregard Step 4.

4. Lightly coat the exposed balsa on both ends of the aileron with epoxy. This will prevent the aileron from becoming fuel soaked.



5. Wipe off any excess epoxy using a paper towel and rubbing alcohol.

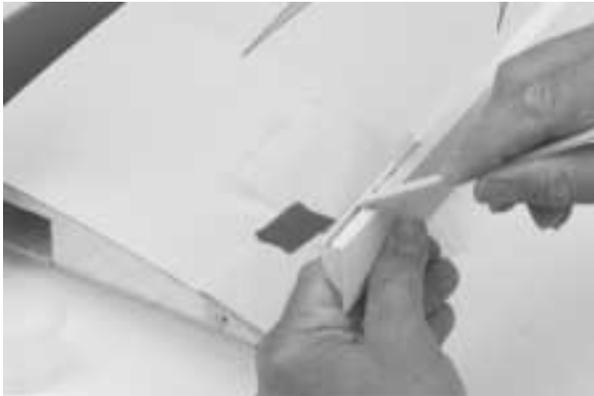


Section 1: Assembling the Wings

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6. Mix a small amount, approximately 1/4 oz., of 30-minute epoxy to be used for installing the aileron onto the wing half. Apply the epoxy to the top and bottom of the remaining half of each hinge, as well as the aileron torque rod hole. Using either a mixing stick or a piece of scrap wood, apply epoxy inside each hinge slot on the wing.

Note: It's helpful to use a piece of wax paper between the aileron and wing half at the aileron torque rod location. This will prevent epoxy from adhering to the aileron and wing where the torque rod is located, which would prevent the aileron from being free to move.



7. Replace the aileron on the right wing half. Ensure that the hinges are properly aligned and that the aileron torque rod presses into its respective hole in the aileron. Note that the gap between the aileron and the wing should remain a constant 1/16", or as tight as possible without affecting the free movement of the aileron.



8. Carefully wipe off any excess epoxy using a paper towel and rubbing alcohol.

9. Repeat Steps 1–8 for the left wing half.

10. Allow the epoxy to cure completely overnight before proceeding to the next step.

11. After both ailerons are securely hinged, firmly grasp the wing and aileron to check that the hinges are securely installed in the wing. To do this, apply gentle but firm pressure, trying to separate the aileron from the wing.

CAUTION: Use care that you do not crush the wing.



Section 2: Joining the Wing Halves

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Right wing panel from Section One• Left wing panel from Section One• Three plywood wing joiners	<ul style="list-style-type: none">• 6-minute epoxy• 30-minute epoxy• Clips (e.g., clothespins, binder clips (4))• Rubbing alcohol• Paper towels• Masking tape• Wax paper• Ruler• Pencil• Medium sandpaper• Mixing stick/epoxy brush• Felt tipped pen

1. Carefully remove the three individual wing joiners from the die-cut plywood sheet. If necessary, gently sand to remove any rough spots. Once these are glued together, they will form what is called the wing dihedral brace.



2. Mix up a small amount, approximately 1/4 oz., of 6-minute epoxy. Using either a mixing stick or epoxy brush, apply the epoxy to both sides of **one** of the wing joiners. Place the epoxied wing joiner on top of one of the two remaining wing joiners. Stack the remaining wing joiner on top of the epoxied wing joiner. Align the upper and lower edges of all three joiners, as well as the area which has the slight "V" shape.



3. Clamp the three joiners together using four clothespins or clips. Make sure the joiners remain aligned and the clamps are firmly attached.



4. Wipe away the excess epoxy using a paper towel and rubbing alcohol, being careful not to disturb the alignment of the wing joiners. **Note:** The excess epoxy should be removed before it cures.



Section 2: Joining the Wing Halves

CONTINUED

5. Allow the epoxy to cure completely before removing the clamps.

6. Using a pencil and a ruler, mark the center or "V" section of the wing joiner, or wing dihedral brace, you have just created. This mark will serve as the center line when joining the wing halves.



7. Trial fit the dihedral brace, or wing joiner, into one of the wing panels. It should insert smoothly up to the center line marked in Step 6. Now slide the other wing half onto the dihedral brace until the wing panels meet. If the fit is overly tight, it may be necessary to lightly sand the dihedral brace. Check to see if the alignment of the wing is accurate.



8. Now check for the correct dihedral angle. To do so, place the wing on a large, flat surface (with the aileron rods hanging off the edge) with one wing panel resting on the surface; the opposite wing tip should be exactly $4\frac{1}{2}$ " from the surface (see illustration below). A good point to measure from is where the plastic wing tip joins the end of the wing panel. If the angle

measurement is not $4\frac{1}{2}$ ", **very** lightly sand the wing rib on just **one** of the wing panels. Refit the wings and re-check the angle.

9. Separate the wing halves and remove the dihedral brace.

10. Place the wing halves on the flat surface so the bottoms are facing upward. Note the wing root (the exposed wood end of the wing halves) as shown below. Using a felt tipped pen, place a mark at the leading edge and trailing edge of the servo bay location on each wing half. These marks serve as a guide when the slot for the aileron servo and aileron servo tray is cut out.

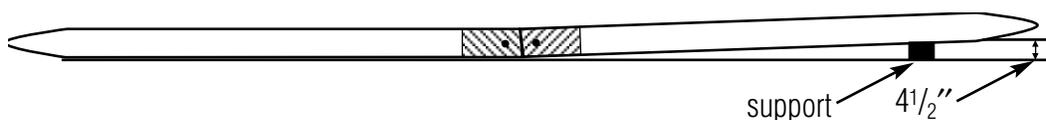
Note: Be careful to exactly mark this location as you do not want to cut into the plywood surrounding this area later in Section 3.



11. Mix up approximately three ounces of 30-minute epoxy.

Note: When joining the wing halves, it is extremely important to use plenty of epoxy.

12. Use a mixing stick or a scrap piece of wood to apply a generous amount of epoxy into the wing joiner cavity of one wing half. Make sure the epoxy is applied to all sides of the cavity.



Section 2: Joining the Wing Halves

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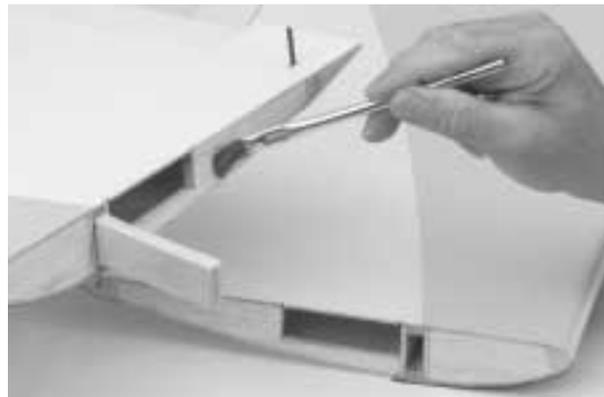
13. Coat one half of the dihedral brace with epoxy up to the center line drawn in Step 6. Install the epoxy-coated side of the dihedral brace into the wing joiner cavity up to the center line, making sure the “V” of the dihedral brace is positioned correctly (with the wing upside down, the “V” will also be upside down).



14. Apply a generous amount of epoxy into the wing cavity of the other wing half.



15. Smear epoxy on all sides of the exposed area of the dihedral brace and uniformly coat both wing roots with epoxy.



Section 2: Joining the Wing Halves

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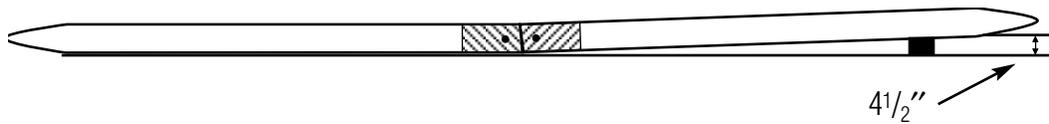
16. Carefully slide the two wing halves together, ensuring they are accurately aligned. Firmly press the two wing halves together, allowing the excess epoxy to run out. Use care that you do not crush the wing by using too much force. Use rubbing alcohol and a paper towel to clean off the excess epoxy. There should not be any gap between the wing halves.



Note: It's a good idea to place a sheet of waxed paper under the center joint of the wing so any excess epoxy doesn't adhere to the surface of the work area. Use rubbing alcohol and a paper towel to wipe off any excess epoxy.



17. Apply masking tape at the wing joint to hold the wing together securely while the epoxy cures. Place the wing on a large, flat surface. With one wing panel lying flat on the surface, the opposite wing tip should be propped up exactly $4\frac{1}{2}$ " from the surface. Allow the wing joint to dry overnight.



Section 3: Installing the Aileron Servo Tray

Parts Needed

- Wing
- Plywood aileron tray
- Plywood aileron tray support (2)
- Aileron servo
- Wing center tape

Tools and Adhesives Needed

- Masking tape
- Hobby knife
- Felt tipped pen
- 6-minute epoxy
- Thick CA glue
- Epoxy brush
- Rubbing alcohol
- Paper towels
- Scissors

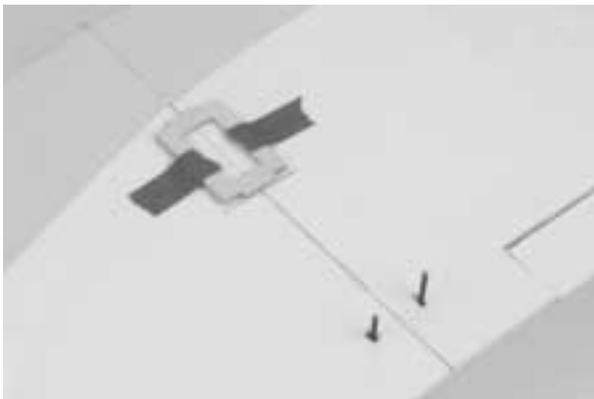
1. After the wing joint has completely cured, remove the masking tape.

2. Remove the aileron servo tray and the two tray supports from the 1/8" die-cut plywood sheet.

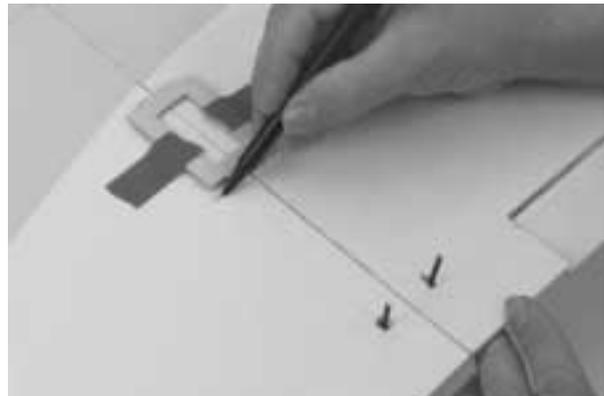


3. Turn the wing upside down and place the aileron servo tray between the marks that were made previously in Section 2, Step 10. Center the tray across the seam between the wing halves.

4. Tape the tray in place with two pieces of masking tape, ensuring that the alignment is not disturbed.



5. Trace around the outside upper and lower parallel edges of the servo tray using a felt tipped pen. These marks will serve as the guides for cutting the servo tray support slots later in this section. Additionally, place a mark along each of the outside vertical edges of the tray. These marks will be the outer edges of the servo tray support slots.



6. Using a felt tipped pen, trace around the inside edge of the aileron servo tray; then remove the tray from the wing.



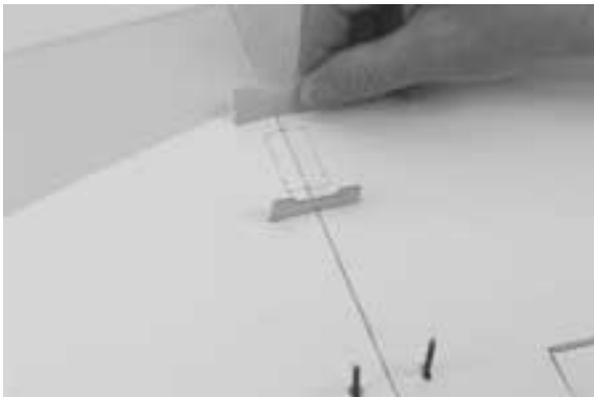
Section 3: Installing the Aileron Servo Tray

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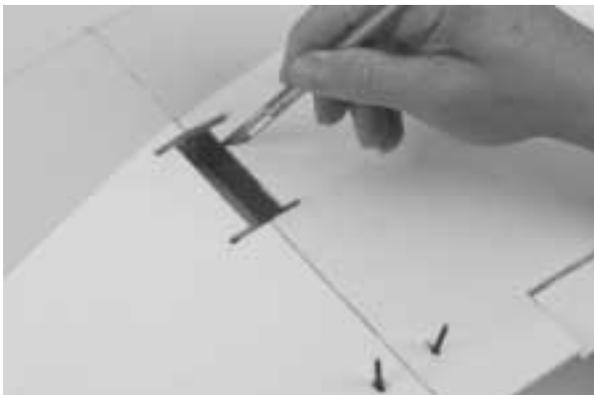
7. With a sharp hobby knife, carefully cut a 1/8" wide slot which is 1-5/8" in length through both the covering and the balsa wood along the lines which were drawn in Step 5 of this section. Remove the excess balsa from the slots.



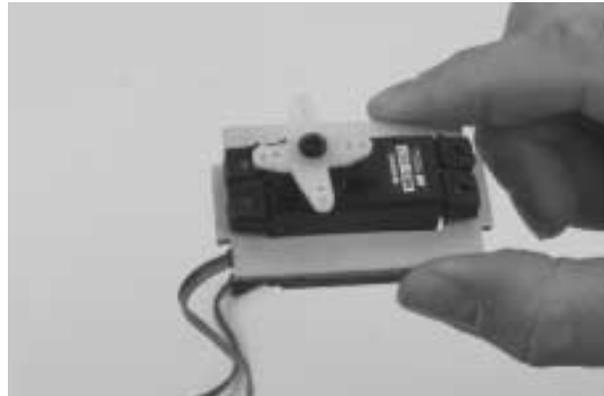
8. Trial fit the aileron tray supports into the slots. It may be necessary to enlarge the slots slightly to accommodate the supports.



9. Using a sharp hobby knife, carefully cut through the balsa wood and the covering along the lines that were drawn in Step 6 of this section. Remove the excess balsa from this hole.



10. Trial fit the aileron servo into the servo tray, as well as into the hole which was cut in the previous step. Position the servo so the servo horn is closest to the trailing edge. Depending upon the dimensions of the aileron servo, it may be necessary to enlarge either the servo tray or the servo hole slightly.

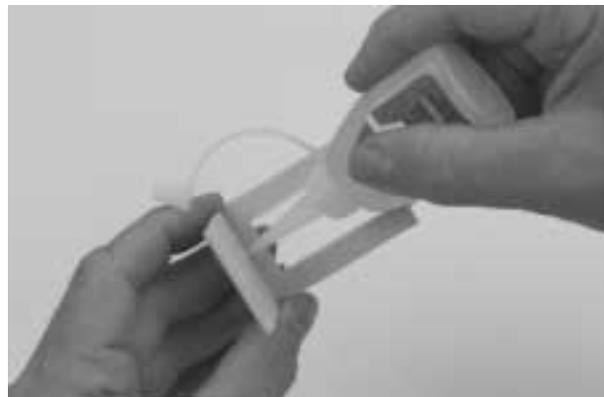


Section 3: Installing the Aileron Servo Tray

CONTINUED

11. Mix a small amount, approximately 1/4 oz., of 6-minute epoxy and apply it to one of the aileron servo supports between the two tabs. Position the aileron servo tray in place as shown and lightly spread epoxy along the joint between the aileron servo tray and the aileron servo support.

Note: Thick CA can be used instead of epoxy for this procedure.



12. Repeat this procedure for the opposite aileron servo support, making sure the aileron servo supports and the servo tray remain perpendicular to one another. Allow the epoxy, or CA, to dry completely before proceeding to the next step.

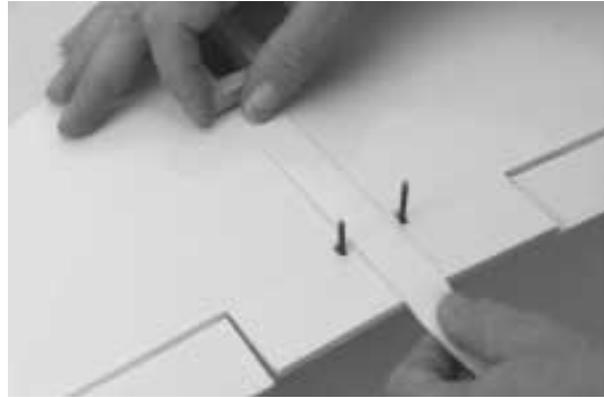
Section 3: Installing the Aileron Servo Tray

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13. After the epoxy has cured, mix a small amount, approximately 1/4 oz., of 6-minute epoxy to glue the servo tray into the wing. Using an epoxy brush, apply the epoxy to the aileron servo supports. Insert the assembled unit into its receptacle in the wing. Remove any excess epoxy with a paper towel and rubbing alcohol. Allow the epoxy to cure.



14. Locate the wing center tape and remove the adhesive backing. Starting at the rear of the aileron servo tray, wrap the tape completely around the wing joint seam to the rear of the servo tray. Gently pulling on the tape while pressing it down onto the wing will provide a smooth seam. Cut off any excess tape with a pair of scissors.



Section 4: Assembling the Fuselage

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Fuselage• Plywood servo tray	<ul style="list-style-type: none">• Hobby knife or file• Epoxy brush• 30-minute epoxy• Rubbing alcohol• Paper towel

1. Remove the plywood servo tray from the die-cut plywood sheet.



2. Trial fit the throttle, elevator, and rudder servos into the servo tray. Depending upon the servos used, it may be necessary to enlarge the openings of the tray slightly using a file or a sharp hobby knife.



3. After the proper servo fit has been achieved, remove the three servos from the servo tray. Trial fit the servo tray into the fuselage, noting the correct orientation. The single servo cut-out should be closest to the front of the fuselage.

Note: The tray should seat snugly into the notches in the servo tray support and fuselage former. If it's too tight, use a file or sharp hobby knife to remove a small portion of the tab from the servo tray.



Section 4: Assembling the Fuselage

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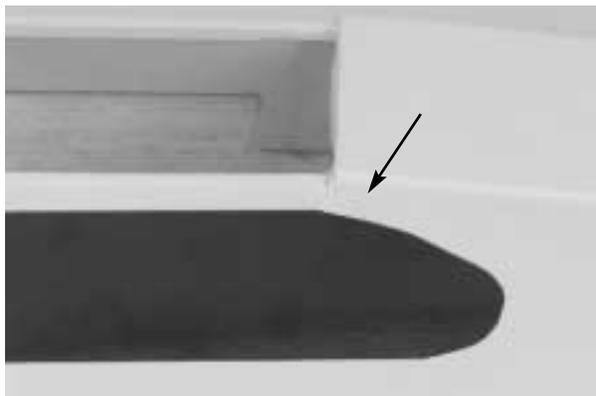
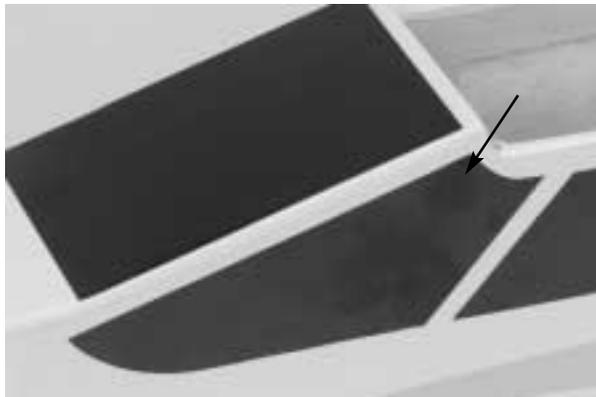
4. Mix a small amount, approximately 1/8 oz., of 30-Minute Epoxy. Using an epoxy brush, apply epoxy to the servo tray in the areas that will come in contact with the servo tray support and the fuselage sides. Install the servo tray into the fuselage, noting the correct orientation as shown at the right.



Section 5: Installing the Wing Dowels

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Fuselage• Wing dowels (5 1/8") (2)	<ul style="list-style-type: none">• 6-minute epoxy• Epoxy brush• Hobby knife• Paper towels• Rubbing alcohol

1. Locate the four pre-drilled wing dowel holes, two on either side of the fuselage. Using a sharp hobby knife, carefully cut the covering away from each of the holes as shown.



2. Insert one of the wooden dowels into each of the wing dowel holes, making sure that an equal amount of dowel extends from each side of the fuselage.



3. Mix a small amount, approximately 1/4 oz., of 6-minute epoxy. Using an epoxy brush, apply a thin coat of epoxy to the wing dowels as shown to prevent the dowels from becoming fuel-soaked during flight. The epoxy will also prevent the dowel from moving in the holes.



4. If necessary, wipe away the excess epoxy using a paper towel and rubbing alcohol, being careful not to disturb the alignment of the wing dowels.

Section 6: Hinging the Vertical and Horizontal Stabilizers

Parts Needed

- Horizontal stabilizer with elevator
- Vertical stabilizer with rudder

Tools and Adhesives Needed

- 30-minute epoxy
- Mixing stick
- Epoxy brush
- Paper towels
- Rubbing alcohol
- Sandpaper (medium)

1. Carefully remove the rudder from the vertical stabilizer by pulling straight out with even pressure.

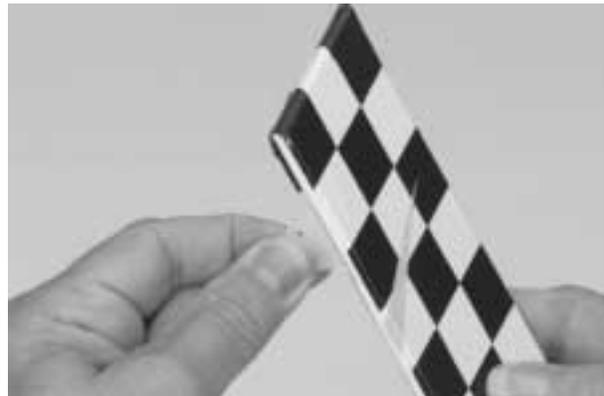
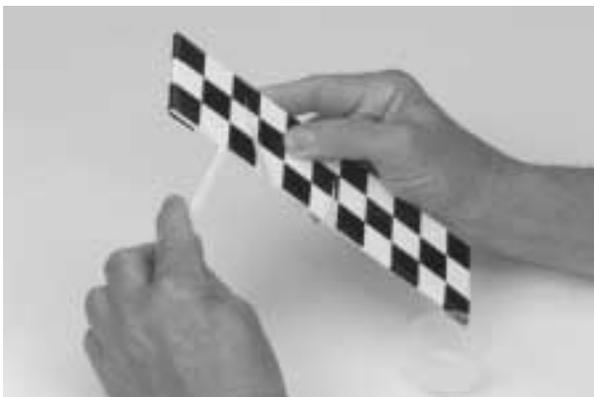


2. Remove the three hinges from the rudder and flex them along the hinge line so they move freely.

3. Mix a small amount, approximately 1/4 oz., of 30-minute epoxy. Using either a mixing stick, scrap of wood or epoxy brush, sparingly apply the epoxy inside each hinge slot on the rudder. Additionally, apply a small amount of epoxy to the top and bottom one-half of each hinge.

It's necessary to roughen the surface of the hinges with sandpaper so the epoxy will adhere better to the hinge.

Insert the hinges into the rudder until the hinge line is even with the leading edge of the rudder.



4. Apply epoxy to the remaining half of each hinge and into the hinge slots in the vertical stabilizer as well. Replace the rudder onto the vertical stabilizer.



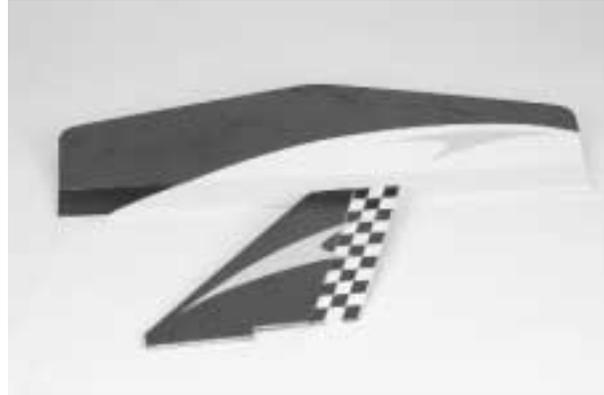
Section 6: Hinging the Vertical and Horizontal Stabilizers

CONTINUED

5. Carefully wipe away any excess epoxy using a paper towel and rubbing alcohol.



6. Repeat this procedure to install the elevator to the horizontal stabilizer.



Section 7: Installing the Tail

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Fuselage• Wing• Horizontal stabilizer with elevator• Vertical stabilizer with rudder	<ul style="list-style-type: none">• 30-minute epoxy• Hobby knife with #11 blade• Straight edge• Pencil• Felt tipped pen• Masking tape• T-pins• Rubbing alcohol• Paper towels• Epoxy brush• Mixing stick• 90 degree triangle• Ruler• Airplane stand (optional)

1. Using a hobby knife, carefully cut out the covering at the front of the horizontal stabilizer slot as shown. The vertical stabilizer will be inserted into this slot later.



2. On the rear of the fuselage, slots are pre-cut for the vertical stabilizer and the rudder pushrod exit. Using a sharp hobby knife, carefully cut out the opening for the vertical stabilizer. The opening for the rudder pushrod will be cut out later in Section 15, Step 18.



3. Trial fit the horizontal stabilizer in place on the fuselage. Check the alignment of the horizontal stabilizer by measuring from a fixed point along the center line of the fuselage to the leading edge on each side of the horizontal stabilizer. The distance to the tip of the horizontal stabilizer must be equal on both sides. If it's not, adjust the stabilizer until the measurements are the same.



Section 7: Installing the Tail

CONTINUED

4. Install the wing, then check the alignment of the horizontal stabilizer by measuring from a fixed point on the wing (tip of wing) to the tip of the elevator. Both right and left dimensions should be the same.

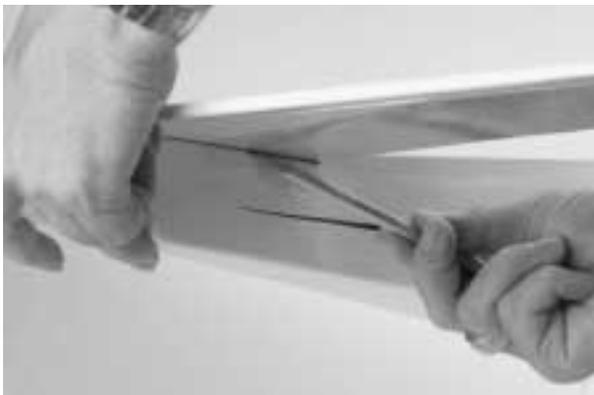


5. Sight the stabilizer alignment from the rear of the airplane, making sure the stabilizer is exactly level with the wing.

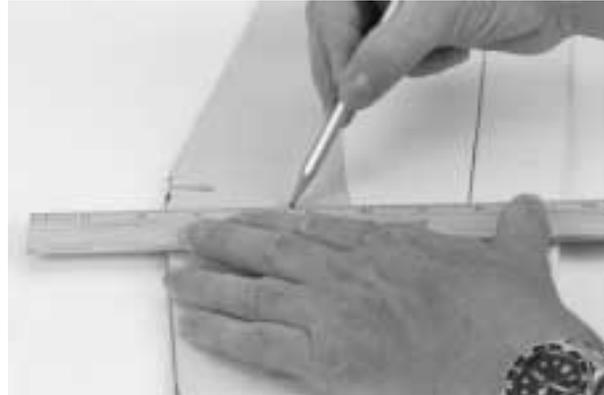


6. When you're satisfied with the alignment, use a pencil to carefully trace around the bottom of the stabilizer where it meets the fuselage.

Note: It's important not to disturb the alignment of the stabilizer. The pencil should leave a light indentation in the covering.



7. Remove the horizontal stabilizer from the fuselage. Using a straight edge make sure the lines drawn are straight. Using a sharp hobby knife, carefully cut away the covering inside the lines marked above. Be careful not to cut into the wood as doing so will weaken the structure.



8. Mix approximately 1/8 ounce of 30-minute epoxy to install the horizontal stabilizer. Using an epoxy brush or mixing stick, spread epoxy onto the bottom of the horizontal stabilizer along the area where the covering was removed in the previous step and to the fuselage where the horizontal stabilizer mounts.



Section 7: Installing the Tail

CONTINUED

9. Install the horizontal stabilizer onto the fuselage and adjust the alignment as described in Step 4 and 5.

Note: It's important to make sure the horizontal stabilizer is also level to the fuselage. Use masking tape to hold it in place while the epoxy cures.

10. Wipe off any excess epoxy using a paper towel and rubbing alcohol. Allow the epoxy to cure before proceeding to the next step.

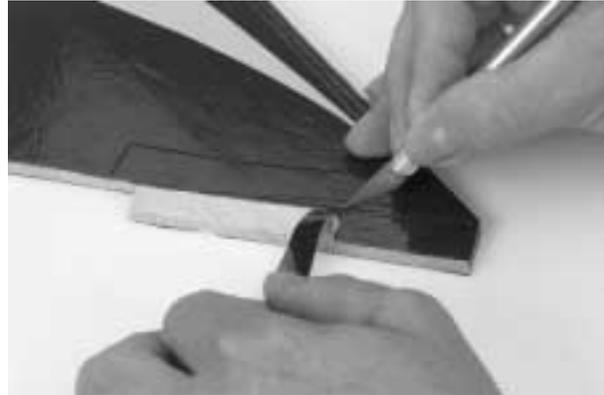
11. Trial fit the vertical stabilizer in position. Using a 90-degree triangle, check to be sure that the vertical stabilizer is perpendicular to the horizontal stabilizer.



12. Using a pencil, trace around the vertical stabilizer where it meets the fuselage. Again, the pencil should leave a light indentation in the covering of the vertical stabilizer.



13. Remove the vertical stabilizer from the fuselage. Using a sharp hobby knife, carefully cut away the covering below the lines drawn in the previous step. Do **not** cut into the balsa wood as this will affect the structural integrity of the stabilizer.



14. Mix up approximately 1/4 ounce of 30-minute epoxy to install the vertical stabilizer. Using an epoxy brush or mixing stick, spread the epoxy on the vertical stabilizer where it contacts the fuselage and to the bottom of the stabilizer where it will seat on the horizontal stabilizer. Additionally, apply epoxy through the vertical stabilizer slot onto the horizontal stabilizer.

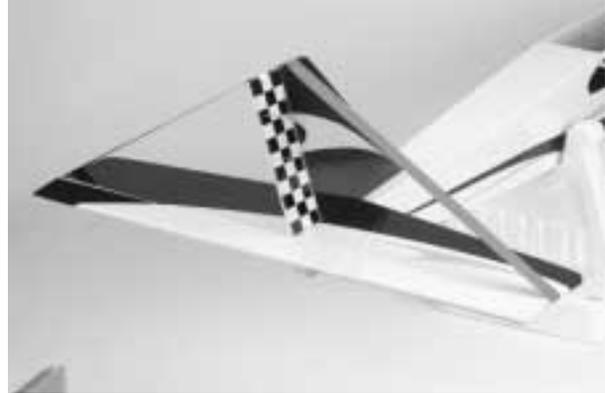


Section 7: Installing the Tail

CONTINUED

15. Insert the vertical stabilizer into the fuselage, ensuring that it's seated properly on the horizontal stabilizer. Precisely align the vertical stabilizer as described in Step 11 of this section.

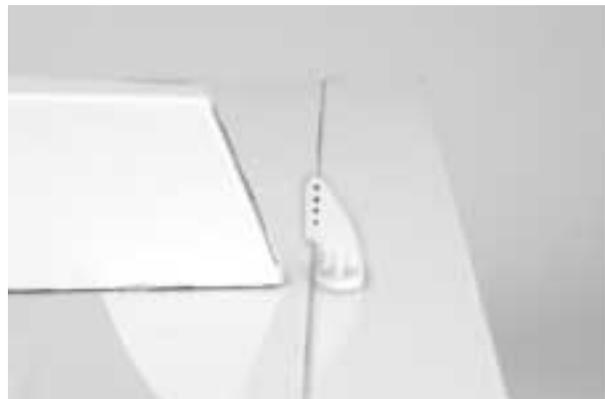
16. Secure the vertical stabilizer in place using masking tape and allow the epoxy to cure completely.



Section 8: Installing the Control Horns

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Control horns (2)• Control horn back plate (2)• Control horn screws (4)• Fuselage (with vertical and horizontal stabilizers)	<ul style="list-style-type: none">• Drill• 1/16" drill bit• Felt tipped pen• Phillips screwdriver (medium)• Ruler

1. Using a hobby knife, cut away the covering in the aft end of the fuselage. This slot will serve as the exit for the elevator pushrod.



3. When you're satisfied with the alignment of the control horn, mark the mounting hole positions with a felt tipped pen.

2. Turn the fuselage over and place one of the control horns on the bottom of the elevator as shown. The vertical portion of the control horn must be positioned such that it's centered over the hinge line and centered in relation to the slot that was opened in the previous step.



Section 8: Installing the Control Horns

CONTINUED

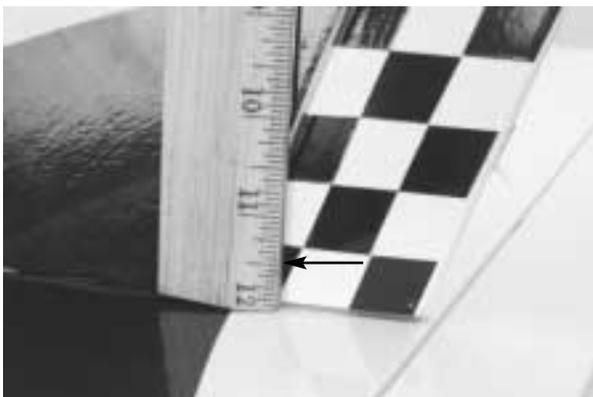
4. Remove the control horn and drill two 1/16" holes through the elevator as shown.



5. Attach the elevator control horn using the hardware provided (horn and back plate) and fasten in place using a Phillips screwdriver.



6. Turn the fuselage over so it's resting upright. Measure up 1/2" from the bottom of the rudder and mark with a felt tipped pen. This mark will serve as the center of the rudder control horn.



7. Center the control horn over the mark made in the previous step, making sure it's centered over the hinge line. Again, mark the location of the control horn mounting hole positions when you're satisfied with the alignment.



8. Remove the rudder control horn and use a 1/16" drill bit to drill these two mounting holes.



9. Install the rudder control horn using the screws and back plate provided.



Section 9: Assembling and Installing the Fuel Tank

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Fuel tank• Fuel tubing (not supplied)• Fuel clunk• Aluminum tube, short (pickup)• Aluminum tube, short (optional fill tube)• Aluminum tube, long (vent)• Silicone tubing• Rubber stopper• 3mm self-tapping screw• Fuselage• Foam collar• Music wire (2) (optional)	<ul style="list-style-type: none">• Phillips screwdriver (medium)• Hobby knife• Masking tape (optional)

1. Locate the fuel tank and the fuel tank accessory bag. You will also find the foam collar in the large parts bag.



2. Insert the short aluminum tube into one of the open holes in the black stopper so that an equal amount of the tube extends from either side.



3. Locate the longer aluminum tube and carefully bend it with your fingers as shown. This tube will be the fuel tank vent tube, which will be connected to the pressure fitting of your motor's muffler when the engine is plumbed in Section 16.

Note: Bend this tubing slowly and carefully so it doesn't kink.



Section 9: Assembling and Installing the Fuel Tank

CONTINUED

4. Slide this tube into the remaining hole in the black rubber stopper.

Note: The “fill” hole part of the rubber stopper is **not** open and would have to be opened if you want to add the “fill” function. After the tank is full, this tube must have a stopper put in to prevent fuel from leaking out.

Note the orientation of the tubes in the fuel tank rubber stopper. The portion of the stopper with the “bump” is the front (facing outward); the smooth surface is the rear (inside the tank) of the stopper. Also note that the stopper fits over the outside of the tank neck.



5. Slide the two black plastic caps over the aluminum tubes as shown, noting the orientation of the caps. The small inside cap and the “bumps” face away from the black rubber stopper. The large outside cap and the “bump” go away from the black rubber stopper.



6. Locate the silicone fuel tubing and the metal clunk. Insert the fuel clunk into one end of the fuel tubing. This assembly will be used for the fuel pickup inside the fuel tank.



7. Install the open end of the fuel tubing on the shorter aluminum tubing.



8. Carefully insert the assembly into the fuel tank and, using the self-tapping screw, screw the stopper together firmly. It helps if the screw has been inserted in the assembly and started — then insert the assembly into the tank and tighten the screw so the stopper is snug in the tank. As the screw is tightened, the stopper parts come together, compressing the rubber stopper snugly inside the throat of the tank.



Section 9: Assembling and Installing the Fuel Tank

CONTINUED

Note: It's important to make sure the fuel tank clunk doesn't touch the rear of the fuel tank. If it does, simply cut a small portion of the silicone fuel tubing until the clunk no longer reaches the rear of the tank. A sample cut-away of a typical fuel tank is shown in the photo below.



9. Select two of the longer pieces of music wire and insert both into the fuselage through the hole in the firewall. Do not insert all the way. These pieces of music wire will serve as guides for passing the fuel tubing attached to the fuel tank stopper into the fuel tank compartment when installing the fuel tank.

10. Cut the fuel tubing (not supplied) into a 3-1/2" piece and a 4-1/2" piece. Attach the 4-1/2" piece of fuel tubing to the vent tube. Attach the 3-1/2" piece to the fuel tank pickup tube. To make identification easier, attach a piece of masking tape to the fuel vent tubing to distinguish it from the fuel pickup tubing. Or, you can simply remember the fuel vent tubing is the longer piece (4-1/2").

11. Place the foam fuel tank collar around the neck of the fuel tank.

12. Slide the fuel tubing of the fuel tank over the two pieces of music wire in the fuselage



13. Press the fuel tank firmly against the firewall until the stopper inserts into the hole in the firewall. The rubber stopper of the fuel tank will be nearly flush with the firewall. The fuel tank should fit snugly into the compartment held in place by friction against the fuselage formers.



Section 10: Installing the Main Landing Gear

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Main landing gear (2)• Landing gear straps (2)• 3mm self tapping screws (4)• Wheels (2)• Wheel collar with screws (4 pcs)	<ul style="list-style-type: none">• Epoxy brush• Felt tipped pen• 6-minute epoxy• Hobby knife with #11 blade• Drill• 1/16" drill bit• Phillips screwdriver (medium)• Thread lock

1. Locate the main landing gear slot located in the bottom of the fuselage by running your hand along the underside of the fuselage. The slot is located approximately 12" back from the edge of the engine firewall. Using a sharp hobby knife, remove the covering from the slot.



2. Mix a small amount, approximately 1/8 oz., of 6-minute epoxy. Using an epoxy brush, lightly coat the exposed wood in the slot to prevent it from becoming fuel soaked.



3. After the epoxy has cured, locate the two main landing gear struts and insert them into the landing gear slots as shown. Make sure the ends fit into the holes in the edges of the slot.



4. Remove the two landing gear straps from the plastic parts tree and place them across the landing gear struts so they are evenly spaced on the landing gear. Using a felt tipped pen, mark the location of the two landing gear mounting strap holes.



Section 10: Installing the Main Landing Gear

CONTINUED

5. Remove the landing gear straps and landing gear from the fuselage. Using a 1/16" drill bit, drill four 1/16" holes as marked in the previous step.



7. Place the wheels on the ends of the landing gear struts and secure them with the supplied wheel collars. Place a wheel collar on both sides of the wheel. Use thread lock on the wheel collar screws.



6. Reposition the two main landing gear struts and the landing gear mounting straps. Using the four 2.6mm self-tapping screws from the hardware bag, fasten the landing gear to the bottom of the fuselage as shown.



Section 11: Installing the Nose Gear

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Nose gear• Nose gear control horn with 3mm screw• 5/32" wheel collar with 3mm screw (2)• Nose wheel (1)• Plastic spacer (from parts tree)	<ul style="list-style-type: none">• Phillips screwdriver (medium)• Thread lock

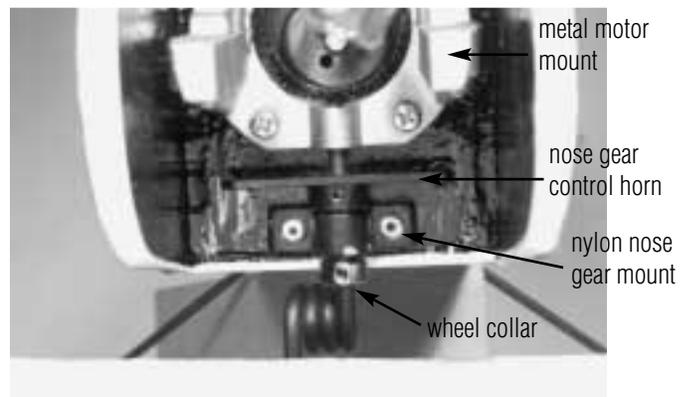
1. The nose gear mount is pre-assembled onto the front firewall of the fuselage. Locate the nose gear, nose gear control horn, two 5/32" wheel collars, and three 3mm screws. One of the 3mm screws will be used in the nose gear control horn.



2. With the screw hole facing forward, slide the nose gear control horn onto the straight end of the nose gear. Note the orientation as shown below.



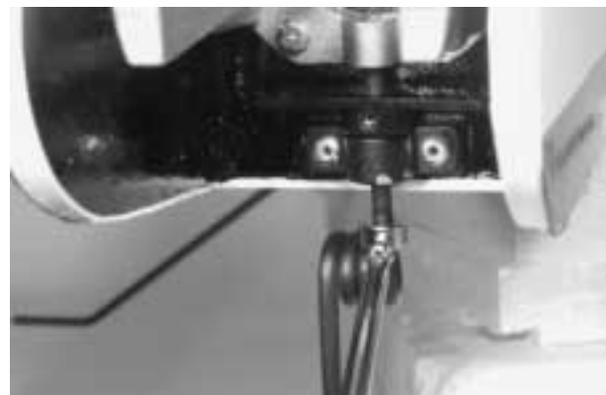
3. Place a 5/32" wheel collar on the nose gear. Insert the nose gear into the nylon nose gear mount. Insert the nose gear steering arm onto the nose gear between the nylon motor mount and metal motor mount as shown. Insert until the coil is just below the bottom of the fuselage.



4. Adjust the nose gear control horn until the arm is parallel with the firewall.

Note: The axle of the nose wheel should be parallel to the firewall as well. Apply thread lock to a 3mm screw and secure the steering arm in place.

CAUTION: Do not overtighten the 3mm screw as the threads of the control horn can be easily stripped out.



Section 11: Installing the Nose Gear

CONTINUED

5. Secure the wheel collar using thread lock and a 3mm screw.



6. Attach the nose wheel to the nose gear strut and hold in place with a plastic spacer from the plastic parts tree, a 5/32" wheel collar and a 3mm screw. Be sure to secure the screw with thread lock.



Note: Final assembly of the nose gear will be done in the section on control linkage hookup.

Section 12: Installing the Engine

Parts Needed

- Engine
- Engine mounting bracket (2)
- Engine mounting screws and nuts (4 each)
- Fuselage

Tools and Adhesives Needed

- Phillips screwdriver (medium)
- Thread lock

1. Remove the two engine mounting brackets, four 4x20mm screws and four 4mm nuts from the hardware bag.

2. Position the engine (without muffler) on the motor mount so the center line of the engine is in line with the center line of the fuselage (center the engine in the motor mount).

Note: On some engines, it may be necessary to remove a small section of the fuselage sidewall to allow clearance for the needle valve.



3. Place one engine mounting bracket across each of the engine mounting lugs as shown.

Note: The “dimpled” side of the engine mounting bracket is the bottom, and therefore the smooth surface should face upward.



4. Insert one 4x20mm screw into each of the engine mounting bracket holes. Press one of the 4mm nuts into the corresponding receptacles on the bottom of the motor mount. Apply thread lock to secure the nut in place and firmly tighten the screw. Repeat the procedure for the other three screws.



Section 13: Installing the Spinner

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Spinner• Spinner back plate• Spinner screws (2)• Fuselage with motor mounted	<ul style="list-style-type: none">• Phillips screwdriver (medium)

1. Remove the propeller nut and prop washer from the engine. Locate the spinner, spinner back plate and two screws.



3. Attach the spinner to the spinner back plate using the two screws provided in the hardware bag.



2. Install the spinner back plate on the engine crankshaft. Place the propeller on the crankshaft and position it so it seats correctly against the spinner back plate. Next, install the engine washer and the prop nut onto the crankshaft and tighten securely.

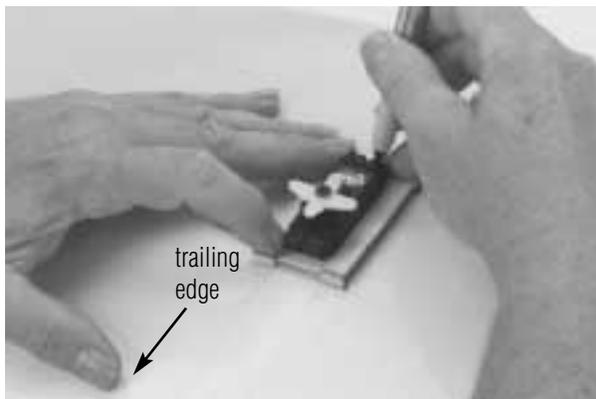


Section 14: Installing the Radio and Centering the Servos

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• 4-channel radio with 4 servos and hardware (not included)• Fuselage• Wing• Radio packing foam (not included)• Antenna tube (optional, not included)	<ul style="list-style-type: none">• Drill• 1/16" drill bit• Phillips screwdriver (small)• Hobby knife• Pencil• Felt tipped pen

Aileron Servo Installation

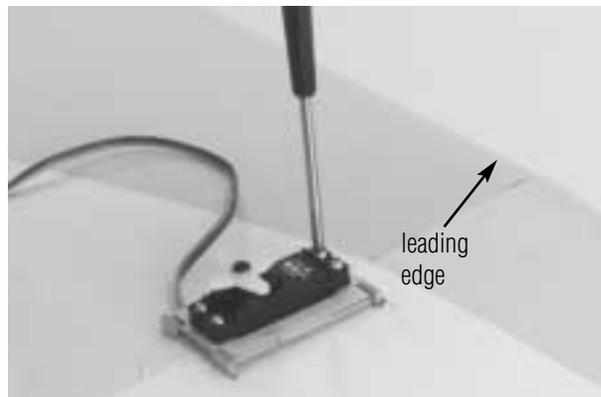
1. Install the rubber servo grommets and eyelets in the aileron servo and place the servo into the aileron mount as shown. Mark the position of the four servo mounting holes with a pencil or felt tipped pen.



2. Remove the servo from the aileron servo tray. Using a 1/16" drill bit, drill the four mounting holes marked in the previous step.



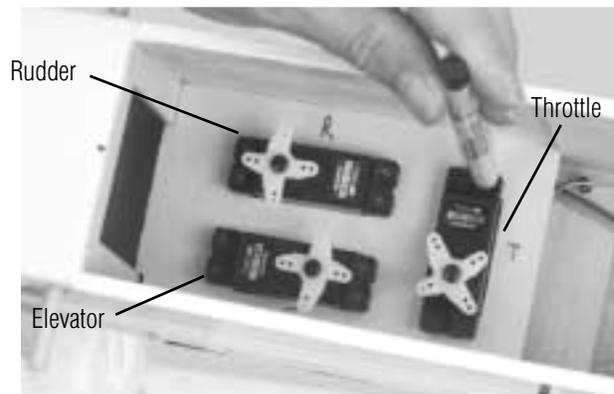
3. Place the aileron servo back in its mount in the wing and secure it in place using the four screws included with the servo.



Rudder, Elevator and Throttle Servo Installation

4. Install the rubber grommets and eyelets in the three remaining servos. It's helpful to label each servo as to its function (i.e., rudder, elevator, throttle) by using a piece of masking tape attached to the connector end of each servo lead. This will be helpful for connecting the servos to the receiver after they're installed in the servo tray. Note also the use of "R", "E", and "T" to identify where the servos are placed on the servo tray.

Position the three servos in the fuselage servo tray as shown, noting the location of the output horns. Using a pencil or felt tipped pen, mark the 12 servo mounting hole positions.



Section 14: Installing the Radio and Centering the Servos

CONTINUED

5. Remove the servos and drill the 12 mounting holes as marked using a 1/16" drill bit. Re-install the servos, again noting the position of the output horns.

Screw the servos in place using the 12 servo screws included with the servos.



Installing the Receiver and Battery Pack

6. Use 1/4" radio packing foam (available from your local hobby dealer) when installing the receiver and battery pack. With a sharp hobby knife, cut a solid layer of foam to the size of the compartment in front of the servo tray. Cut out another layer of foam that's identical in size, however, cut an opening in the center of this foam so it will accept the receiver battery pack.

Place another solid layer of foam on top of this layer. Cut another layer of foam to accept the receiver. The final layer of foam should be solid.



7. Place the layers of foam with the battery and receiver in the front compartment of the fuselage as shown. Route the antenna back through the fuselage using an antenna tube (not included), or route it outside the fuselage back to the vertical stabilizer.



Section 14: Installing the Radio and Centering the Servos

CONTINUED

Installing the Switch

8. The switch should be mounted on the left side of the fuselage, away from the potentially harmful exhaust gases. Locate the pre-cut switch mounting hole on the inside of the fuselage and, using a sharp hobby knife, carefully remove the covering from this slot.



9. Detach the switch plate from the receiver switch harness. Center the switch plate over the hole cut in the previous step. Using a felt tipped pen, mark the screw holes on either end of the switch plate.



10. Remove the switch plate from the fuselage. Drill the two mounting holes as marked using a 1/16" drill bit.



11. Reposition the switch plate as shown and place the switch on the inside of the fuselage. Using the two screws supplied with the switch, attach the switch to the fuselage. The suggested orientation of the switch is to have the "on" position forward and the "off" position toward the back.



Section 14: Installing the Radio and Centering the Servos

CONTINUED

Centering the Servos

12. Hook up the servos and switch harness to the receiver and battery pack as per the instructions included with your radio system. Remove the servo horns from the servos. Turn on your transmitter first, then turn on the receiver. Center the mechanical trims on your transmitter. Turn off the receiver first, then turn off your transmitter — be certain to do it in that order. You have just electrically “centered” your servos.

Note: You can turn your transmitter and receiver off anytime, but to keep the “electrical center” of your servos, turn the receiver off first, then the transmitter. To turn on again, turn on the transmitter first, then the receiver.

13. Replace the servo horns on each servo so the arms are 90 degrees to the center line of the fuselage, as shown in the photo below. This will allow you to mark your control rods, knowing your servos are at their electrical center position.



Section 15: Installing the Linkages

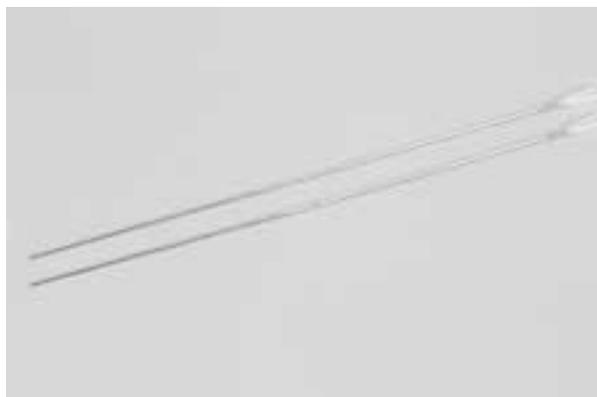
Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Aileron horns (2)• Long threaded music wire rods (2)• Short threaded music wire rods (4)• Wing• Fuselage• Heat shrink tubing (2)• Clevises (5)• Dowel (16-5/8") (1) (rudder)• Dowel (23-5/8") (1) (elevator)• Pieces of fuel tubing (optional—cut into 7mm lengths for placing over clevises)	<ul style="list-style-type: none">• Z-bend pliers• Needle nose pliers• Ruler• Thick CA glue• Hobby knife• Heat gun

Installing the Aileron Linkages

1. Remove the two aileron horns from the plastic parts tree. Thread the aileron horns onto the aileron torque rods in the wing until the rod is flush with the aileron horn.



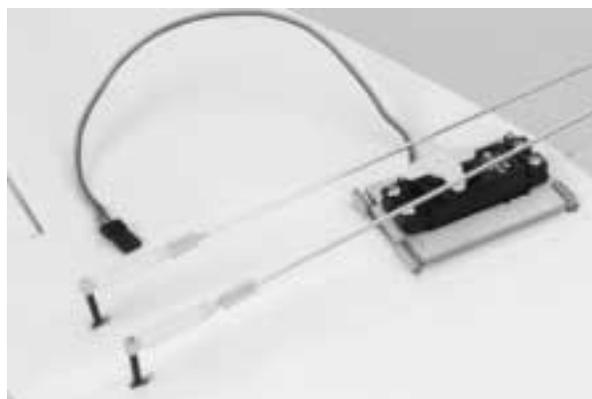
2. Locate two of the shorter threaded rods and two clevises.



3. Screw a clevis onto the threaded end of each rod, making 12 complete turns.

4. Attach the clevises onto their respective aileron horns.

Note: It's a good idea to place a piece of fuel tubing (cut into 7mm length) over the clevises. This will provide extra insurance against the clevises accidentally coming open.



5. Center the aileron servo using the method described in Section 14, Step 12–13 and, using a felt tipped pen, place a mark on the unthreaded end of the aileron pushrods where they pass their respective servo arm.



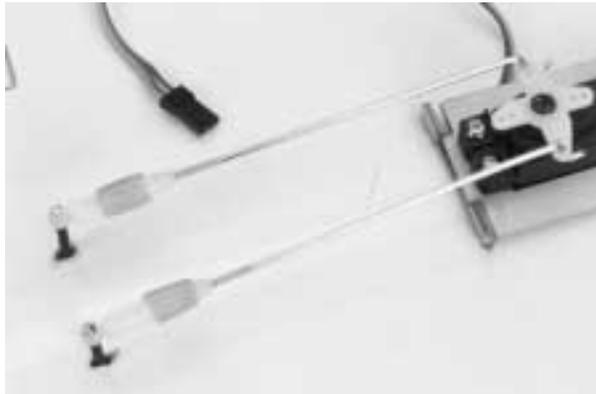
Section 15: Installing the Linkages

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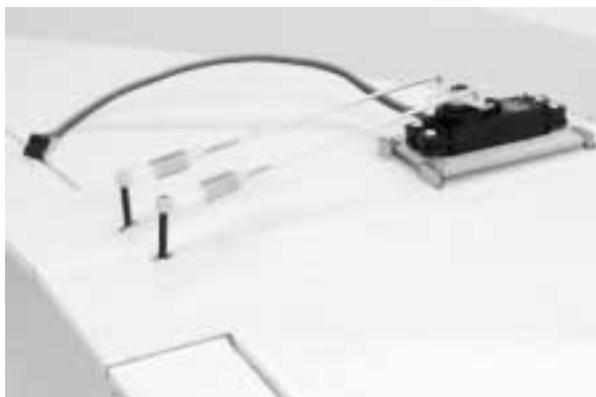
6. Using z-bend pliers, make a z-bend at the marked location on each rod and cut off the excess rod. Set the excess rod aside for now — they will be used for the construction of the elevator and rudder pushrods later.



7. Install the z-bend into the outermost hole on either side of the servo arm.



8. Adjust the aileron torque rod length by screwing in or out until the aileron is exactly in the neutral position when the servo is centered and the clevis is in the aileron horn. Adjust both sides.



Rudder Pushrod

9. Locate one of the short threaded rods, one piece of the extra length of rod from Step 6, one piece of the yellow heat shrink tubing, one clevis, and the shorter pushrod dowel.

10. Using a sharp hobby knife or a pair of scissors, cut the heat shrink tubing into two equal pieces

11. Cut 7" of the threaded rod (measured from the threaded end). This rod will be used to attach the clevis to the rudder control horn.

12. Using a needle nose pliers, bend a 90 degree angle, 1/4" from the unthreaded end of the threaded rod.



13. Insert the 90-degree bend into the hole of the pushrod dowel and saturate the dowel with thick CA glue where the rod contacts the dowel. Allow to cure.



Section 15: Installing the Linkages

CONTINUED

14. Slide a piece of heat shrink tubing over the end of the pushrod dowel and use a heat gun to shrink it in place over the rod/dowel connection.



15. Locate the extra length of rod from Step 6. Using a needle nose pliers, make a 90 degree bend 1/4" from one end of this rod.

16. Insert the 90 degree bend into the remaining hole of the pushrod dowel and saturate it with thick CA glue where the rod contacts the dowel.

17. Slide a piece of heat shrink tubing over the end of the pushrod dowel and shrink it into place using a heat gun. The completed rudder pushrod is shown below.



18. Carefully cut away the covering on the aft side at the tail where the rudder pushrod will exit.

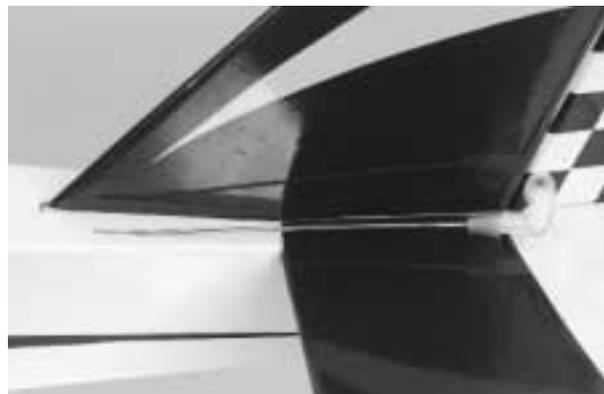


19. Insert the rudder pushrod assembly, threaded end first, into the fuselage so the threaded end exits the rudder pushrod hole in the fuselage.



20. Screw on a clevis 12 complete turns. Fasten the clevis in the third hole from the inside of the rudder control horn.

Note: It's a good idea to place a piece of fuel tubing (7mm long) over the clevis as extra insurance to prevent the clevis from accidentally coming open.



Section 15: Installing the Linkages

CONTINUED

21. Turn on both the transmitter and receiver. Adjust all the trims on the transmitter to their neutral positions. Make sure the rudder servo horn is in its neutral or electrical zero position (refer to the “Centering Servos” Section on page 41). Center the rudder servo and, using a felt tipped pen, place a mark on the unthreaded end of the rudder pushrod assembly where it passes the respective servo arm.



22. Using z-bend pliers, make a z-bend at the marked location on the rod. Cut off the excess rod.

23. Insert the z-bend into the servo arm. It may be necessary to enlarge the servo arm hole slightly to accept the z-bend.



Elevator Pushrod

24. If you did not do so in Section 8, Step 1, you will need to carefully cut away the plastic covering at the rear of the fuselage where the elevator pushrod will exit.



25. Repeat Steps 9–17 of this section to assemble the elevator pushrod.

Note: The elevator pushrod dowel is long, so cut the threaded music wire 5” from the threaded end of the rod. Cut the remaining piece of the music wire to a 6” length. The threaded end will connect to the elevator control horn.

26. Insert the elevator pushrod assembly, threaded end first, into the fuselage so the threaded end exits the elevator pushrod opening in the fuselage tail end.

27. Screw on a clevis 12 complete turns. Fasten the clevis in the third hole from the inside of the elevator control horn.

Note: It’s a good idea to place a piece of fuel tubing over the clevis as extra insurance to prevent the clevis from accidentally coming open.



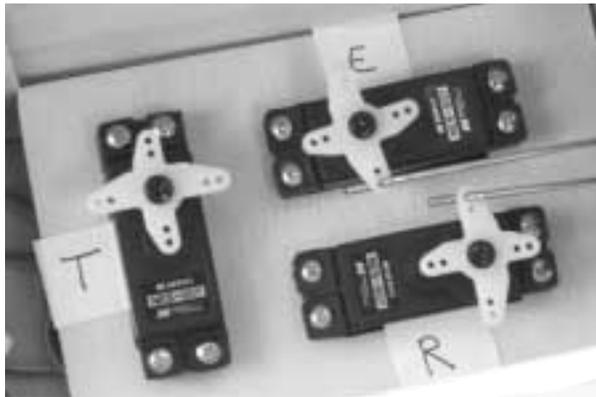
Section 15: Installing the Linkages

CONTINUED

28. Center the elevator servo as we did in Step 21 of this section and, using a felt tipped pen, place a mark on the pushrod where it passes the respective servo arm.

29. Using z-bend pliers, make a z-bend at the marked location on the rod and cut off the excess rod.

30. Insert the z-bend into the servo arm. **Note:** It may be necessary to enlarge the servo arm hole slightly to accept the z-bend.



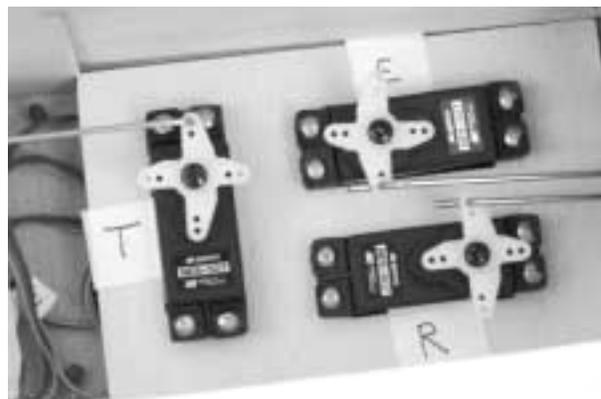
35. Center the throttle servo. Using a felt tipped pen, mark the rod where it passes the throttle servo arm.

Important Note: It's very important to make sure that carburetor remains half open when the throttle servo is centered.



36. Using z-bend pliers, make a z-bend at the marked spot on the rod and cut off the excess rod.

37. Attach the z-bend to the throttle servo arm.



Throttle Linkage

31. Locate one of the longer threaded rods (17-3/4") and one clevis.

32. Screw the clevis onto the threaded end of the rod 12 complete turns.

33. Insert the threaded rod, unthreaded end first, through the 1/16" hole in the fuselage firewall. The rod should exit into the radio/servo tray compartment.

34. Attach the clevis to the throttle lever of the carburetor, opening the carburetor halfway. Remember to install a small piece of fuel tubing on the clevis to make sure it doesn't accidentally open.



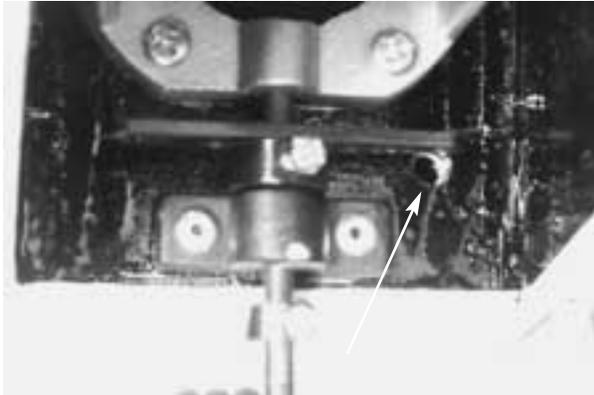
Section 15: Installing the Linkages

CONTINUED

Nose Wheel Linkage

38. Locate the remaining long threaded rod (17-3/4") and clevis.

39. Locate the 1/16" hole in the firewall near the nose wheel steering arm.



40. Insert the threaded rod, threaded end first, through the nose wheel linkage opening in the firewall, through the fuel tank compartment, and into the radio/servo tray area.

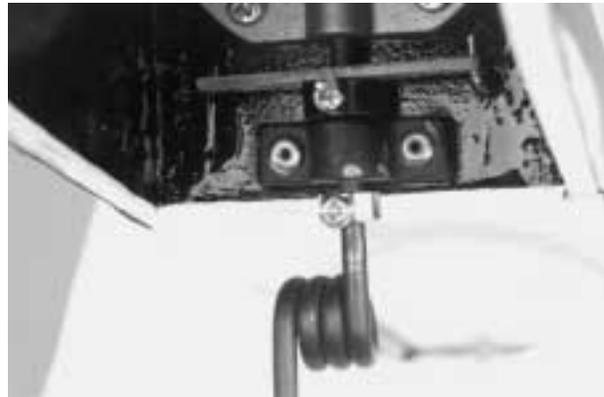
41. Screw on a clevis 12 full turns. Fasten the clevis into the outermost servo arm hole of the rudder servo arm opposite the rudder pushrod z-bend on the rudder servo arm.



42. Be sure the rudder servo is centered. Using a felt tipped pen, place a mark on the **unthreaded** end of the steering pushrod where it passes the nose wheel steering arm.

43. Using z-bend pliers, make a z-bend at the marked location on the rod. Cut off the excess rod. **Helpful Hint:** Removal of the steering pushrod/clevis may make forming the z-bend easier.

44. Insert the z-bend into the outermost hole in the nose wheel steering arm. It may be necessary to loosen the nose gear assembly during installation of the z-bend. Adjustments to centering of the wheel/steering arm can be made by screwing in/out the clevis attached to the rudder servo arm.



Section 16: Plumbing the Engine

Parts Needed	Tools and Adhesives Needed
<ul style="list-style-type: none">• Fuselage with engine mounted• Muffler	<ul style="list-style-type: none">• Hobby knife• Phillips screwdriver (medium)

1. Install the muffler per the instructions included with the engine. Now is a good time to install your glow plug if you have not done so.



2. Connect the vent tube from the fuel tank to the pressure fitting on the muffler. Remove the masking tape at this time.

3. The remaining tube should be attached to the carburetor fuel inlet nipple.

Section 17: Control Throw Recommendation

The following control throws offer the most positive response and are a good place to begin. After you've become more familiar with the flight characteristics, adjust the control throws to meet your flying style.

Aileron: 3/8" Up, 3/8" Down
Elevator: 1/2" Up, 1/2" Down
Rudder: 7/8" Left, 7/8" Right

Section 18: Balancing the Solo

An important step in preparing the aircraft for flight is properly balancing the model. **Do not inadvertently neglect this step.** The recommended Center of Gravity (C.G.) location for the first flights with the Solo is 3-3/4" from the leading edge of the wing.

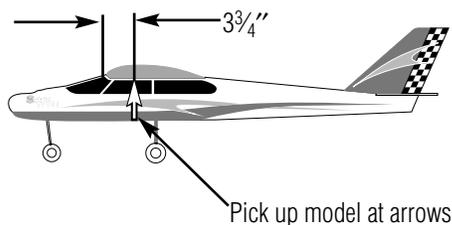
Important: Do not attempt to fly your model before completing this very important section. A model that is not properly balanced will be unstable and could cause serious damage and/or injury.

1. Turn the wing (and plane if assembled) upside down and, about where the center sheeting stops on each side of the wing, measure back 3-3/4" from the leading edge of the wing and make a mark with your felt tipped pen. This is the balance point.

2. With your model fully assembled but without fuel, turn the model upright and pick it up with one finger at each of the balance marks you made earlier. If balanced properly the plane will hang horizontally.

If the plane hangs with the tail down, then you need to add (or redistribute) some weight in the nose. Usually the plane will either balance or hang slightly tail heavy. The easiest cure for a tail-heavy plane is to move the receiver battery up above the fuel tank and use some foam rubber to hold it in place. The receiver can also be moved forward as far as possible.

If the plane hangs nose down, then you need to add some weight to the tail. Stick-on lead weights, which are available from your hobby dealer, make adding weight a simple task.



Section 19: Fine Tuning the Control Linkages

The initial set-up of the control linkages may require some minor adjustments.

Also, if such components as a servo are replaced, it may be necessary to make adjustments to the control throws. In either case, the following steps are provided as a guide in making adjustments to the various controls of your aircraft. It will be helpful to make sure your servos are electrically centered (electrical neutral or "0") before you begin making any linkage adjustments. Refer to Section 14, Steps 12 and 13 for instructions on how to electrically center the servos.

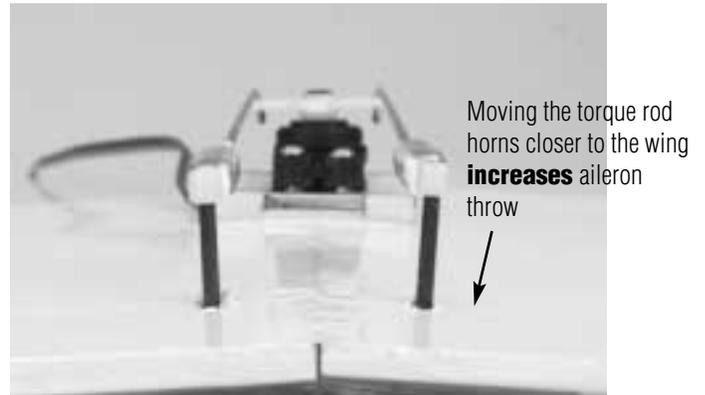
Ailerons

1. With the radio turned on and the aileron servo plugged into the aileron channel (or aileron extension if used), move the aileron stick (the right stick) all the way to the right.
2. The aileron servo horn should rotate in such a direction as to cause the right aileron to move **up** approximately 3/8" and the left aileron to move **down** approximately 3/8", measured at the trailing edge of the aileron. **Note:** Aircraft orientation is as if you are sitting in the cockpit looking forward.



3. If the ailerons do not move in the correct direction, switch the aileron servo reversing switch on the transmitter.

4. If the ailerons do not move far enough, either move the pushrods out on the servo horn (farthest hole from center, both sides), or move the torque rod horns down farther on the aileron torque rods. Moving the torque rod horns closer to the wings **increases** aileron throw.



Elevator

5. With the elevator servo in its electrical zero or centered position, make sure the servo horn is 90-degrees to the center line of the aircraft. Adjust the clevis until the elevator is in its neutral position (no up or down). Make sure to remember to center the elevator trim on your transmitter.
6. With the radio system turned on, move the elevator stick (the right stick) upward (away from you, down elevator). The elevator should move down approximately 1/2" measured at the trailing edge of the elevator.



7. If the elevator moves up, switch the elevator servo reversing switch on the transmitter.

Section 19: Fine Tuning the Control Linkages

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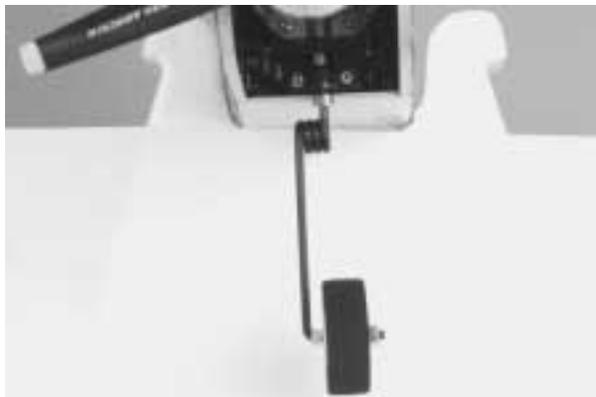
8. If the elevator does not move far enough, either move the pushrod out farther on the servo horn, or move the clevis in farther on the elevator control horn.

9. If the elevator moves too much, either move the pushrod in on the servo horn, or move the clevis out farther on the elevator control horn.

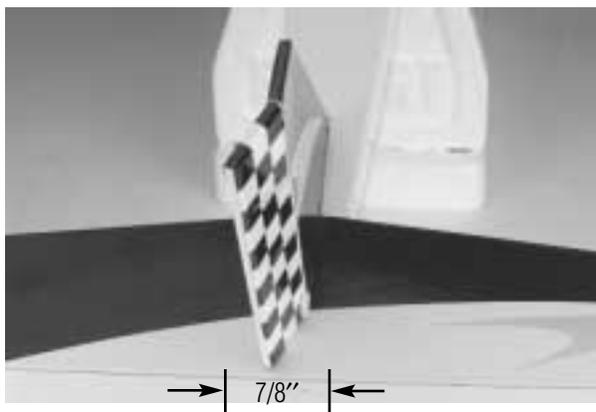
Rudder/Nose Gear

10. With the rudder servo horn in its neutral (electrical 0) position, adjust the clevis, if necessary, until the rudder is in its neutral position (no left or right). Check to make sure the rudder trim lever on the transmitter is centered.

11. With the rudder and rudder servo in their neutral positions, adjust the nose gear so it (the wheel) is pointing directly forward so that with no rudder input (left or right), the aircraft will track straight ahead on the ground.



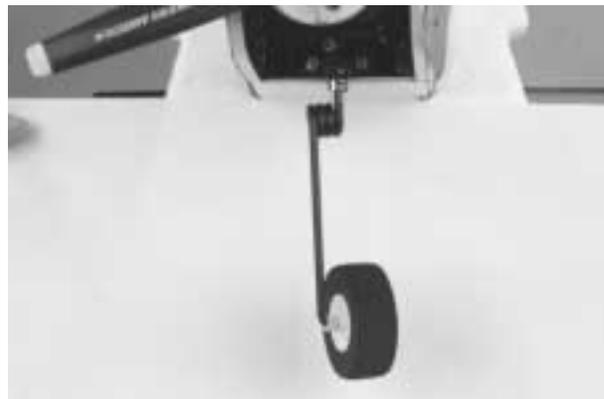
12. With the radio system turned on, move the rudder stick (the left stick) to the right. The rudder should move to the left (remember, aircraft orientation is as if you are sitting in the cockpit). The rudder should move approximately 7/8", measured at the trailing edge of the rudder.



13. If the rudder moves right, switch the rudder servo reversing switch on the transmitter.

14. If the rudder doesn't move far enough, either move the pushrod out farther on the servo horn, or move the clevis in on the rudder control horn. If the rudder moves too much, either move the pushrod in on the servo horn or out on the rudder control horn.

15. The nose wheel should rotate the same direction as the rudder.



Throttle

16. Before fine tuning your throttle linkage, you need to (1) disconnect the clevis to the throttle arm of the carburetor to prevent overtravel, and then (2) electrically zero the throttle servo, if it hasn't been done. Remove the throttle servo horn from the throttle servo, but keep the throttle pushrod connected to the horn. We will reconnect the servo horn in Step 18 of this section.

17. Move the throttle stick (left, positionable stick on most transmitters) all the way down to the idle position, and move the throttle trim lever on the transmitter all the way down.



Section 19: Fine Tuning the Control Linkages

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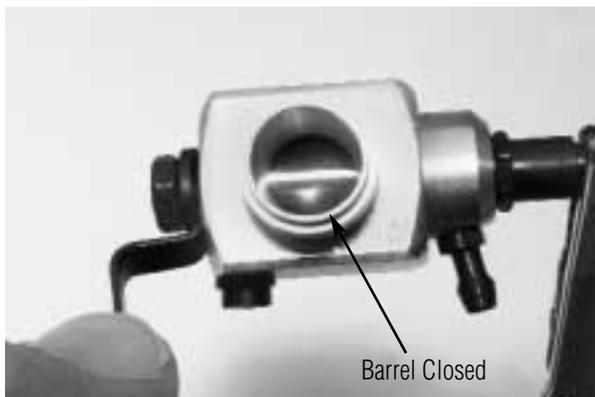
18. Place the throttle servo horn on the servo so the arm is positioned at the two o'clock position.

Note: We've trimmed off three of the servo arms to preclude any fouling of the control linkages either with each other or with any of the wiring. The decision to trim off the arms is optional.

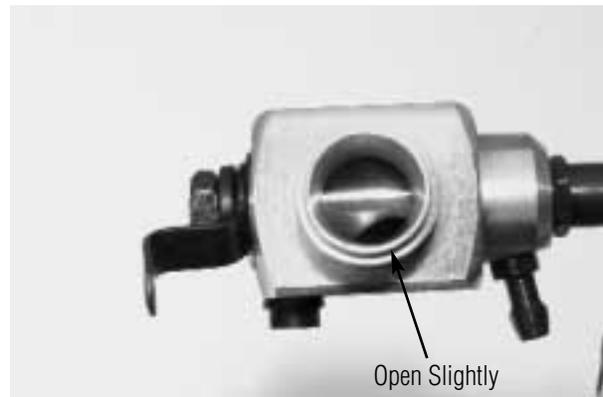
19. Move the throttle arm on the engine so it's in the fully closed position; then, connect the clevis of the throttle pushrod to the throttle arm.

20. With the radio system still on, move the throttle stick up slightly and check to make sure the throttle arm and pushrod rotate toward the front of the aircraft (counterclockwise). The carburetor throttle barrel should open slightly.

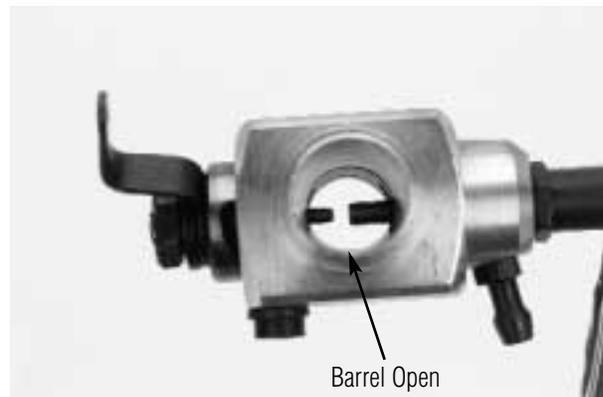
21. Move the throttle stick back or fully down and the throttle trim to its fully down position. Look at the opening in the top of the carburetor to see if the throttle barrel is fully closed. If not, adjust it to fully closed by screwing in the clevis on the pushrod, thus shortening the rod length.



22. With the radio still on, move the throttle trim lever up to its centered position. This should open up the carburetor barrel slightly ($1/32 - 1/16$ "") and allow the engine to idle satisfactorily. To shut the engine off from the transmitter, simply move the throttle stick and trim lever all the way down.



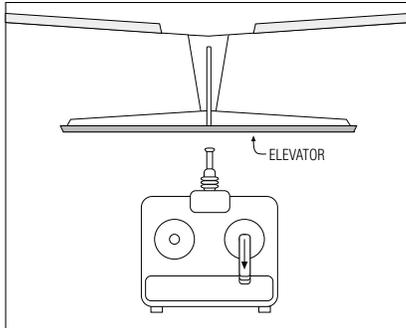
23. Now, move the throttle stick up and watch the carburetor throttle barrel. It should reach full open at the same time the stick reaches its end point, or full up position (high speed). If it doesn't, follow the instructions below:



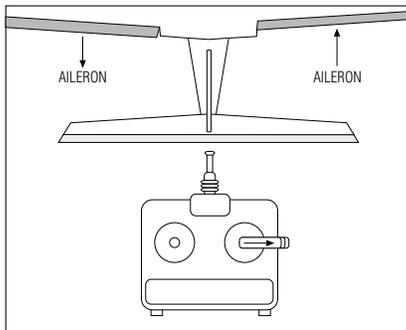
If the throttle barrel does not open all the way, move the clevis in one hole in the carburetor throttle arm. If the carburetor throttle barrel reaches full open and makes the servo "hum" very early in the transmitter throttle stick's movement, you have over-travel. Move the pushrod z-bend connection **in** on the servo horn (to a hole that is closest to the center of the horn).

Pre-Flight Check

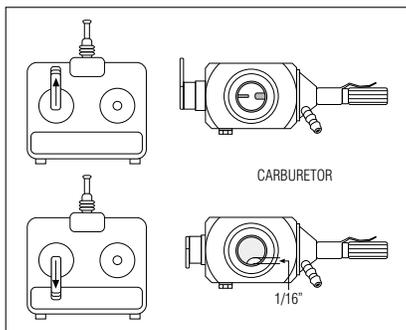
Step 1. Check that all control functions move in the correct direction. If not, use the respective reversing switch to correct the direction.



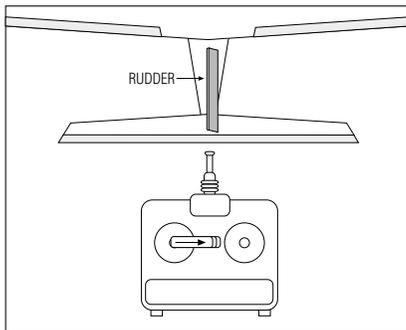
ELEVATOR



AILERON



THROTTLE



RUDDER

Note: Mode II transmitter shown in diagram.

Step 2. Check that each clevis is securely snapped into position.

Step 3. Check that all servo horn screws are tight.

Step 4. Charge the transmitter and receiver battery per the instructions included with your radio system.

Step 5. Read and follow all the instructions included with the engine and follow the recommended break-in procedure.

Pre-Flight at the Flying Field

Range Test Your Radio

Step 1. Before each flying session, be sure to range check your radio. This is accomplished by turning on your transmitter with the antenna collapsed. Then turn on the radio in the airplane. With your airplane on the ground, you should be able to walk 30 paces away from your airplane and still have complete control of all functions. If you don't, do **not** attempt to fly! Have your radio equipment checked out by the manufacturer.

Step 2. Double check that all controls (aileron, elevator, throttle, rudder) move in the correct direction.

Step 3. Be sure that your batteries are fully charged per the instructions included with your radio.

Adjusting the Engine

Step 1. Completely read the instructions included with your engine and follow the recommended break-in procedure. 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. Before you fly, be sure your engine reliably idles, transitions and runs at all throttle settings. Only when this is achieved should any plane be considered ready for flight.

AMA Safety Code

1994 Official AMA National Model Aircraft Safety Code Effective January 1, 1994

Model flying must be in accordance with this Code in order for AMA liability protection to apply

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. 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 those persons essential to the flight operations are to be permitted on the flying side of the line; all others must be on the spectator side. Flying over the spectator side of the line is prohibited, unless beyond the control of the pilot(s). In any case, the maximum permissible takeoff weight of the models is 55 pounds.
5. 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. Only those persons accredited by the contest director or other appropriate official as necessary for flight operations or as having duties or functions relating to the conduct of the show or demonstration are to be permitted on the flying side of the line. The only exceptions which may be permitted to the single straight line requirements, under special circumstances involving consideration of site conditions and model size, weight, speed, and power, must be jointly approved by the AMA President and the Executive Director.
6. Under all circumstances, if my model weighs over 20 pounds, I will fly it in accordance with paragraph 5 of this section of the AMA Safety Code.
7. I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. Note: This does not apply to models flown indoors.
8. 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.
9. 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), 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 primary means of propulsion are limited to a maximum weight of 3.3 pounds and a G series motor. Note: A model aircraft is defined as an aircraft with or without engine, not able to carry a human being.
10. I will not operate any turbo jet engine (axial or centrifugal flow) unless I have obtained a special waiver for such specific operations from the AMA President and Executive Director and I will abide by any restriction(s) imposed for such operation by them. (Note: This does not apply to ducted fan models using piston engines or electric motors.)
11. I will not consume alcoholic beverages prior to, nor during, participation in any model operations.

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. I will perform my initial turn after takeoff away from the pit or spectator areas, and I will not thereafter fly over pit or spectator areas, unless beyond my control.
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.) Further, any transmitters that I use at a sanctioned event must have a certified R/CMA-AMA gold sticker affixed indicating that it was manufactured or modified for operation at 20 kHz frequency separation (except 27 MHz and 53 MHz).
5. I will not knowingly operate an R/C system within 3 miles of a pre-existing model club flying site without a frequency sharing agreement with that club.

Glossary

Ailerons. Each side of this airplane has a hinged control surface, called an aileron, located on the trailing edge of the wing. Move the left aileron up and the right aileron down, and the airplane will turn or roll to the left. Perform the opposite actions, and the airplane will roll to the right. This is how you control the airplane's direction in flight.

Carburetor. By adjusting the needle valve in the carburetor, you control the engine's lean/rich fuel mixture and determine the airplane's speed.

Charger. This is the device used to charge/recharge batteries. If NiCad batteries are provided with the radio, a charger is usually provided as well.

Clevis. The clevis connects the wire end of the pushrod to the control horn of the control surface. A small clip, the clevis has fine threads so that you can adjust the length of the pushrod.

Clunk. Located in the fuel tank, a clunk is weighted and ensures that the intake line has a steady supply of fuel.

Computer Radio. By using the advanced programming functions of the transmitter, you can adjust the airplane without changing any mechanical structures.

Control Horn. This arm connects the control surface to the clevis and pushrod.

Control Surfaces. The moveable part on the wing and tail that causes the aircraft to roll (aileron), pitch (elevator) or yaw (rudder).

Dead Stick. When the airplane is in flight gliding, without the engine running, it is called "dead stick."

Dihedral. The degree of angle (V-shaped bend) at which the wings intersect the plane is called dihedral. More dihedral gives an airplane more aerodynamic stability. Some sailplanes and trainer planes with large dihedral dispense with ailerons and use only the rudder to control the roll and yaw.

Electric Starter. This is the small motor commonly used to start the airplane's engine.

Elevator. The hinged control surface functions as an elevator, which you adjust to control the airplane's pitch axis. Pulling the transmitter's control stick toward the bottom of the transmitter adjusts the elevator upward, and the airplane begins to climb. Push the control stick forward, and the airplane begins to dive.

Expanded Scale Voltmeter (ESV). This device is used to check the voltage of the battery pack.

Flight Box. The box in which you store and transport your flying equipment is called a flight box.

Flight Pack or Airborne Pack. These interchangeable terms describe the radio equipment that is installed on the airplane.

Fuel Overflow Line (Vent). This line pressures the fuel tank and provides an even fuel flow to the engine. It also functions as an overflow line when the fuel tank is full.

Fuel Pickup Line. This line connects the fuel tank to the carburetor, usually with a clunk on the tank end to keep the fuel flowing while the aircraft is in flight.

Fuselage. The main body of an airplane.

Glow Plug Clip/Battery. A 1.2-volt battery with a clip which is connected to your engine's glow plug used to start the engine. You remove it once the engine is running smoothly.

High Wing. This term describes an airplane that has its wings mounted on the top of the fuselage.

Hinge. The hinges are the moving blades on the control surface that allow you to control the airplane's movement. All hinges must be glued properly and securely to prevent the airplane from crashing. (This has already been done for you on the Advance 40.)

Horizontal Stabilizer. The horizontal surface of the tail gives the airplane stability while in flight.

Leading Edge. The front of a flying surface.

Main Landing Gear. The wheel and gear assembly the airplane uses to land. It is attached to the bottom of the fuselage.

Muffler. This device muffles engine noise and increases the back pressure from the engine's exhaust stack, which can improve the airplane's performance at low speeds. Mufflers are usually required by R/C Clubs.

Needle Valve. This mechanism within the carburetor adjusts the fuel mixture and throttle. Refer to your engine's manufacturer instructions for directions on how to adjust the needle valve.

Glossary

CONTINUED

NiCad. This abbreviation stands for Nickel Cadmium, the chemical compound used in rechargeable batteries.

Nitro. Short for nitromethane, a fuel additive that improves an airplane's high-speed performance. Check your engine's instructions to determine the ideal nitro content for your engine.

Nose Gear. The part of the landing gear that is attached to the nose of the fuselage. The nose gear is usually connected to the rudder servo to help you steer the airplane on the ground.

Pitch Axis. The horizontal plane on which the airplane's nose is raised or lowered. By adjusting the elevator, you can raise the airplane's nose above the pitch axis (climb) or lower it below the pitch axis (dive).

Pushrod. The rigid mechanism that transfers movement from the servo to the control surface.

Receiver (Rx). The receiver unit in the airplane receives your signals from the ground transmitter and passes the instructions along to the airplane's servos.

Roll Axis. The horizontal plane on which the airplane's wings are raised or lowered. By adjusting the ailerons, you can drop a wing tip below the roll axis and cause the airplane to bank or roll.

Rudder. The hinged control surface on the vertical stabilizer that controls the airplane's yaw. Moving the rudder to the left causes the airplane to yaw left; moving the rudder to the right causes it to yaw right.

Servo. The servo transforms your ground commands into physical adjustments of the airplane while it's in the air.

Servo Output Arm. A removable arm or wheel that connects the servo to the pushrod. Also called servo horn.

Spinner. Term describing the nose cone that covers the propeller hub.

Switch Harness. This switch is commonly located on the fuselage and governs the on/off mechanism for the flight pace.

Tachometer. A device that measures the engine's RPM (rotations per minute) by counting light impulses that pass through the spinning propeller.

Thread Locker. A liquid that solidifies; used to prevent screws from loosening due to vibration.

Torque Rods. Inserted into ailerons, these rigid wire rods run along the wings' trailing edge, then bend downward and connect to the pushrods.

Trainer Airplane. Designed to fly with high stability at low speeds, a trainer model airplane allows new users some extra reaction time as they learn to control the airplane's movements.

Transmitter (Tx). The device used on the ground to transmit instructions to the airplane. Three transmitter modes are used in model airplanes. The most common is Mode II, where the left stick controls the throttle and rudder and the right stick controls the elevator and aileron.

Vertical Stabilizer. The vertical surface of the tail gives the airplane stability while in flight.

Wheel Collar. The round retaining piece that anchors wheels in place on the axle.

Wing. Because wings provide the primary lift force on an airplane, adjustments to the wings affect the airplane's movements while in flight.

Yaw Axis. The vertical plane through which the airplane's nose passes as it yaws to the left or to the right. The rudder controls the yaw axis.

Z-Bend. The wire ends of pushrods have Z-shaped bends, which attach to the servo.

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