HANGAR 9™

EDGE 540

Ultra Aerobatic 1.20 ARF

INSTRUCTION MANUAL

ULTRA SERIES™

- 90% prebuilt
- High-quality hardware included
- Precovered in genuine Goldberg UltraCote®
- Prefinished fiberglass cowl and wheel pants

Specifications

Wingspan:	78″	198.10 cm
Length:	68.5″	174 cm
Wing Area:	1010 sq. in	651.6 dm^2
Weight (Approx.):	11-13 lbs	5-5.9 kg
Recommended Engines:	1.08 –1.50 2-Stroke	
	1.20 –1.80 4-Stroke	

90% PRE-BUILT ARF

ALMOST READY-TO-FLY

TABLE OF CONTENTS

Introduction

Thank you for purchasing the Hangar 9 Edge 540. This is the latest aerobatic line of fine ARFs (Almost-Ready-to-Fly) produced by Hangar 9. The Edge 540 is a high-performance aircraft best suited for the more experienced flyer and modeler. Although this is an ARF, it does have some construction features that can be challenging for a new modeler. If you encounter difficulty in any construction sequence, please contact one of our technicians. We provide any assistance we can concerning the construction of your Edge 540. Please feel free to contact us at:

Horizon Hobby, Inc.
4105 Fieldstone Road
Champaign, IL 61822
(877) 504-0233
www.horizonhobby.com

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.

Additional Required Equipment

Radio Equipment

4 channels minimum
5 servos (50 in/oz plus servo for standard flying
and 90 in/oz plus servos for 3-D flying)
1100mAh Receiver Battery (JRPB4240)
Y-Harness (if not using a computer radio) (JRP133)
12" Aileron Extensions (2) (JRPA098)

Recommended JR Radio Systems:

JR400EX
JR 421EX
JR XP652
JR XP783
JR XP8103
JR PCM10X

Engine Requirements:

1.08 – 1.48 2-cycle engines
1.20 – 1.80 4-cycle engines

Recommended 2-Cycle Engines

Webra 1.20
Moki 1.35
MDS 1.48

MDS 1.48

Recommended 4-Cycle Engines

Saito 1.20 – 1.80
Saito 1.20 GK – 1.80 GK

Saito 1.80

Additional Items

12" Aileron Extension (2) (JRPA098)
3" Tru-Turn Spinner (TRU 3002)
True Turn Adapter for specific engine
Propeller:
MDS 1.48 = 16" x 8" (recommended)
Saito 1.80 = 16" x 8" (recommended)
Fuel tubing
Fuel Dot (HAN115)
Pitts style muffler for
specific engine (if using MDS 1.48)
Fuel Filter (HAN143)
Foam for cushioning radio and fuel tank
(DUB513)
Antenna Tube (HAN112)

Optional Items

Pilot figure (HAN8272 or HAN8275)
Instrument Panel (HAN186)

Tools and Supplies Required

Adhesives

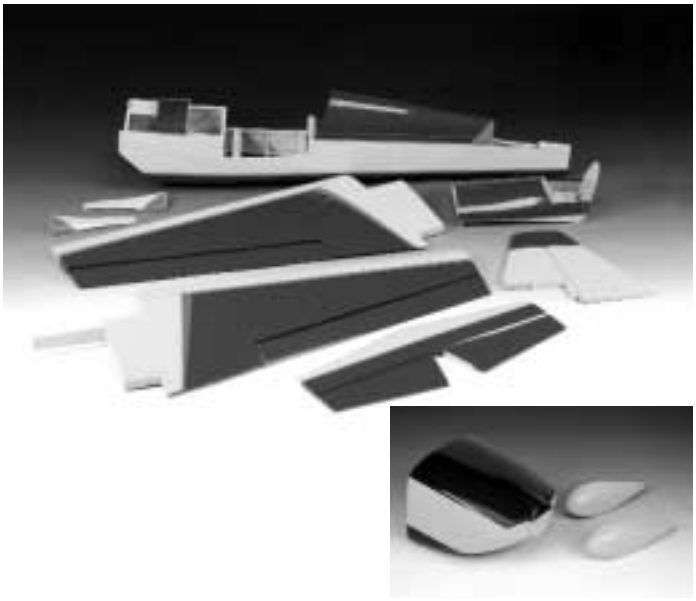
Thin CA (Cyanoacrylate) glue
Thick CA (Cyanoacrylate) glue
6-Minute Epoxy (HAN8000)
30-Minute Epoxy (HAN8002)
Masking tape
Threadlock Z-42 (Pacer)
Canopy Glue (Pacer PAAPT56)
Silver Solder (Staybrite)

Tools

Drill
Drill bits: 1/16", 1/18", 5/32", 1/14"
Soldering iron
Phillips screwdriver
Z-bend pliers
CA remover/debonder
Standard pliers
Mixing sticks
5/32" hex wrench
Medium sandpaper
Moto-tool with sanding drum and cut-off wheel
Hobby knife with #11 blade
Epoxy brushes
Scissors
Straight edge
Rubbing alcohol
1/16" hex wrench
Sanding stick (medium)
Small round file
Paper towels
Felt-tipped pen or pencil
90-degree triangle
Measuring device (36")

Contents of Kit

Large Parts



Fuselage (HAN1351)

Left Wing Half with Aileron (HAN1352)

Right Wing Half with Aileron (HAN1352)

Vertical Stabilizer with Rudder (HAN1353)

Horizontal Stabilizer with Elevator(s) (HAN1353)

Cowl (HAN1354)

Wheel Pants (HAN1355)

Hatch (HAN1358)

Other Parts

Main landing gear (HAN1356)

Wheels (2) (HAN2027)

Fuel tank and hardware (HAN1460)

Trim sheets (HAN1359)

Metal motor mount and hardware (HAN2033)

Tail wheel assembly (HAN2026)

Canopy (HAN1357)

Note: Instrument Panel (HAN186) is optional.
1/4 scale pilot optional (HAN8272 or HAN8275)

Section 1: Hinging the Ailerons

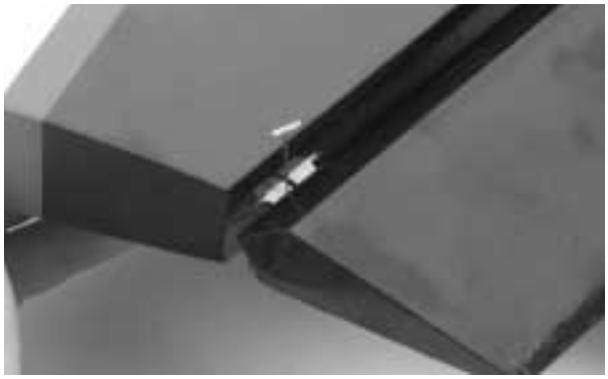
Parts Needed	Tools and Adhesives Needed
• Right wing panel with aileron and hinges • Left wing panel with aileron and hinges	• Instant thin CA glue • CA remover/debonder • Paper towels • T-pin (one for each hinge)(optional procedure)

Note: The control surfaces, including the ailerons, elevators, and rudder, are prehinged with hinges installed, but the hinges are not glued in place. It is imperative that you properly adhere the hinges in place per the steps that follow using a high-quality thin CA glue.

Step 1. Carefully remove the aileron from one of the wing panels. Note the position of the hinges. The Edge 540 comes with high-quality CA-type hinges.

Step 2. Remove each hinge from the wing panel and aileron and place a T-pin in the center of each hinge. Slide each hinge into the aileron until the T-pin is snug against the aileron. This will help ensure an equal amount of hinge is on either side of the hinge line when the aileron is mounted to the wing panel.

Step 3. Slide the aileron on the wing panel until there is only a slight gap. The hinge is now centered on the wing panel and aileron. Remove the T-pins and snug the aileron against the wing panel. A gap of 1/64" or less should be maintained between the wing panel and aileron.



Step 4. Deflect the aileron and completely saturate each hinge with thin CA glue. The aileron's front surface should lightly contact the wing during this procedure. Ideally, when the hinges are glued in place, a 1/64" gap or less will be maintained throughout the length of the aileron to the wing panel hinge line.

Note: The hinge is constructed of a special material that allows the CA to wick or penetrate and distribute throughout the hinge, securely bonding it to the wood structure of the wing panel and aileron.

Step 5. Turn the wing panel over and deflect the aileron in the opposite direction from the opposite side. Apply thin CA glue to each hinge, making sure that the CA penetrates into both the aileron and wing panel.

Section 1: Hinging the Ailerons

CONTINUED

Step 6. Using CA remover/debonder and a paper towel, remove any excess CA glue that may have accumulated on the wing or in the aileron hinge area.

Step 7. Repeat this process with the other wing panel, securely hinging the aileron in place.

Step 8. After both ailerons are securely hinged, firmly grasp the wing panel and aileron to make sure the hinges are securely glued and cannot be pulled out. Do this by carefully applying medium pressure, trying to separate the aileron from the wing panel. Use caution not to crush the wing structure.

Note: Work the aileron up and down several times to "work in" the hinges and check for proper movement.

Sealing the Hinge Gaps

It's imperative that the aileron and elevator hinge lines be sealed airtight to prevent flutter. Sealing the hinge line has several advantages. A sealed hinge line gives a greater control response for a given control deflection. It also offers more precise, consistent control response and makes trimming easier. **Sealing the aileron and elevator hinge line is mandatory. Failure to do so may cause control surface flutter, resulting in a crash.**

Step 9. Cut a piece of clear or blue UltraCote® (not included) for sealing the ailerons to approximately 3" x 28". Fold the UltraCote® down the center with the adhesive side to the outside making a sharp crease at the fold.

Step 10. Using a ruler, measure 3/8" from the folded crease and mark two places with a pen.

Section 1: Hinging the Ailerons

CONTINUED

Sealing the Hinge Gaps (continued)

Step 11. Using a sharp #11 blade and a straight edge, carefully cut through both layers of UltraCote® covering at the 3/8" point marked in Step 2.

Step 12. Mark and cut the folded covering to an overall length of 25 5/6". This piece will be inserted and ironed down into the hinge bevel on the bottom of the aileron.

Step 13. Remove the backing from the UltraCote®. Place the folded crease side into the center of the hinge line on the bottom of the wing. Using a straight edge as shown, hold one side of the overing in place while ironing down theopposite side with a sealing iron. We recommend setting the iron temperature to 320° for this operation.

Step 14. Fully deflect the aileron in the up position. Place the straight edge over the hinge line covering that you just ironed down in Step 5 with the edge of the straight edge placed firmly at the bottom of the hinge line as shown. Iron down this side of the covering, making sure the aileron is fully deflected.

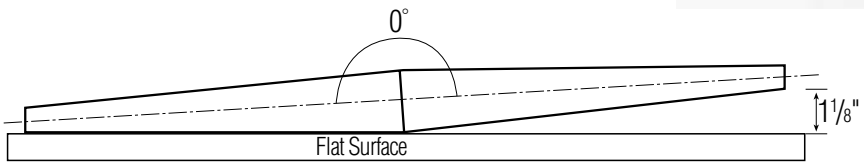
Section 2: Joining the Wing Halves

Parts Needed	Tools and Adhesives Needed
• Right/left wing panels • Dihedral brace • Plywood wing dowel plate • Wooden dowels • Wing bolt plates • Wing trim tape	• 30-minute epoxy • 6-minute epoxy • Mixing stick • Epoxy brush • Masking tape • Hobby knife w/#11 blade • Rubbing alcohol • Paper towels • Wax paper • Ruler • Felt-tipped pen or pencil • Medium sandpaper

Step 1. Locate the plywood wing joiner. Using the ruler, determine the center of the wing joiner and mark it with a felt-tipped pen or pencil.

Step 2. Trial fit the wing joiner into one of the wing panels. It should insert smoothly up to the center line marked in Step 1. Now slide the other wing panel onto the wing joiner until the wing panels meet. If the fit is overly tight, it may be necessary to sand the wing joiner.

Step 3. The correct dihedral angle for the wing is 0 degrees (at the center line). Place the wing on a large flat surface one wing panel resting on the flat surface. The other wing tip should be at 1 1/8" in height from the surface (see illustration below). If necessary, sand the wing joiner until this is achieved. There should be no gaps in the wing center. Once you are satisfied with the fit, remove the wing joiner from the wing panels.



Step 4. Mix approximately 1 ounce of 30-minute epoxy.

Note: It is extremely important to use plenty of epoxy when joining the wing panels together. It will also be helpful to use wax paper under the wing center when epoxying the wing panels together.

Step 5. Using an epoxy brush or a scrap piece of wood, apply a generous amount of epoxy into the wing dihedral cavity in one wing panel.

Step 6. Coat one half of the wing joiner with epoxy up to the line marked in Step 1. Install the epoxy-coated side of the dihedral brace into the wing panel cavity up to the marked center line.

Section 2: Joining the Wing Halves

CONTINUED

Step 7. Apply a generous amount of epoxy into the other wing panel cavity.

Note: You may need to mix up more epoxy to complete the joining process.

Step 8. Now apply epoxy to all sides of the exposed wing joiner and uniformly coat both wing roots with epoxy.

Step 9. Carefully slide the two wing halves together and firmly press them together, allowing the excess epoxy to run out. There should not be any gap in the wing halves. Use rubbing alcohol and a paper towel to clean up any excess epoxy.

Step 10. Apply masking tape at the wing joint to hold the wing halves together securely. Place the wing on a flat surface. With the center wing panels firmly supported to lay flat on the surface, the wing tips should be propped up so it is 1⅛" from the surface. Apply more masking tape the center wing joint and recheck the 1⅛" measurement. Allow the wing joint to dry overnight.

Note: It is useful to use wax paper underneath the wing center while the epoxy is curing. This will help prevent excess epoxy from adhering to the work surface.

Section 2: Joining the Wing Halves

CONTINUED

Step 11. Allow the wing center joint to completely cure, then remove the masking tape.

Step 12. You can mount the two yellow-covered plywood rear wing bolt plates next.

Note: The covering will have to be trimmed away from the area of the top of the wing so the pieces can be epoxied to the wing. Use care not to cut into the wood structure of the wing.

Trial fit the pieces, marking their location. Use a sharp hobby knife to trim away the covering over the bolt holes..

Step 13. Mix 1/4 ounce of 6-minute epoxy and epoxy the wing bolt plates to the top of the wing. The wing bolt plate holes will be drilled out later.

Step 14. Locate the yellow and blue center trim tape. Apply a portion to the center of the top and bottom of the wing center after the epoxy has cured from Step 13.

Section 3: Installing the Aileron Servos

Parts Needed	Tools and Adhesives Needed
• Left/right wing halves • Servos (2) • Servo extension(s) (2-12" recommended) • Y-harness (if using a non-computer radio) • String and a weight to run servo extensions through the wing	• Hobby knife • Phillips screwdriver • Drill • Drill bit: 1/16" • Masking tape • Electrical tape • Pencil or felt-tipped pen

Step 1. Locate the servo opening in one of the wing halves. Install the recommended servo hardware supplied with your radio system onto your servos (grommets and eyelets). Install a servo extension lead to the servo (a 12" extension is recommended). Secure the connectors by tying a knot in the leads and wrapping with electrical tape. This will prevent the connectors from becoming accidentally disconnected inside the wing.

Step 2. Trial fit the servo into the servo opening.Trimming may be required, depending on the type of servo installed.

Step 3. With the servo in place, mark the location of the servo screws used to mount the servo to the plywood servo rail inside the wing servo opening.

Step 4. Using a 1/16"drill bit, drill the servo screw locations marked in the previous step.

Step 5. Before mounting the servo, run the servo lead and extension through the wing and out the opening provided near the wing center. The servo lead exit is located on the top of the wing. Turn the wing over and look for an opening near the center of the wing close to where the wing joiner slot is.

Section 3: Installing the Aileron Servos

CONTINUED

Step 6. Use a piece of string with a small weight (bolt from engine mounting hardware) attached as a device to attach to one end of the servo lead extension and thread through the servo opening, through the wing, and out the servo lead exit. Other methods can be used to thread the servo leads through the wing, but we have found this method is the quickest.

Step 7. Once you have threaded the string and weight through the wing, attach the string to one end of the servo lead and carefully thread it through the wing. Once you have threaded the lead through the wing, remove the string so it can be used for the other servo lead.

Step 8. To prevent the lead from falling back into the wing, use masking tape to temporarily hold it in place by taping the lead to the top of the wing.

Step 9. Repeat the procedure for the other wing half .

Note: If you are using a non-computer radio, it will be necessary to use a Y-harness to connect both aileron servos to the aileron channel of the receiver.

Step 10. Insert the servo into the cutout in the bottom of the wing. Make sure the output shaft of the servo is orientated closest to the leading edge of the wing.

Step 11. Use the screws included with the servos to fasten the aileron servos in place.

Section 4: Installing the Aileron Linkages

Parts Needed	Tools and Adhesives Needed
• Wing assembly from Section 2 • Left control horn • Right (reversed) control horn • Plastic plate (2) • Screws (8) • Short (3-3/4" x 4-40) threaded rod (both ends)(2) • 4/40 metal clevis (4) • Locking clips for clevis (4) • 4/40 nuts (4) • Heavy duty servo arm (JRPA215) (Optional for 3-D throws)	• Phillips screwdriver • Drill • Drill bits: 1/16", 3/32" • Felt-tipped pen or pencil • Moto-tool (optional)

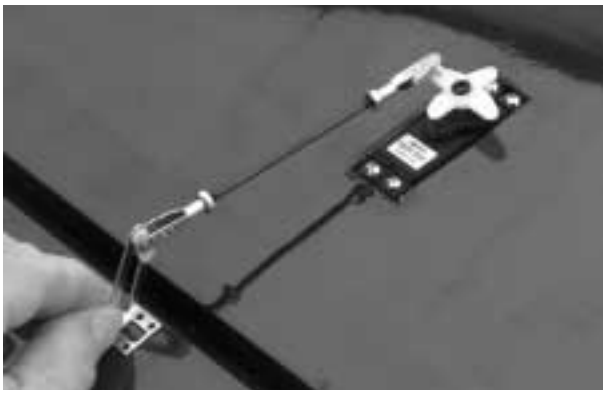
Step 1. For this assembly, you will be using two 3-3/4" threaded rods, four clevis, four 4-40 nuts, and a regular and a reverse metal control horn. Use the 4-40 nuts as locking devices to keep the clevis from turning. There is also a locking clip that keeps the clevis from opening. The reverse control horn has an "R" marked on its base; the standard horn has no marking. For illustration purposes, we will describe the installation of the aileron linkage on the right wing panel (bottom).

Step 2. Thread a 4-40 nut and clevis on each end of the threaded rod. Next locate the standard horn. The link assembly goes on the 2nd outer hole from the end as shown below.

Step 3. The metal clevis will attach to the servo arm that points to the wing tip. If you wish, the other three arms can be trimmed off. To establish the position of each of the clevis on the threaded rod, trial fit the horn and linkage to the servo arm. Adjustments in length are made by screwing one or both clevises in or out.

Step 4. The servo arm should be positioned so it is pointing to the wing tip. When installing the control horn, the holes in the control horns (where the pushrod attaches) should be in line with the control surface hinge line.

Note: If using 3-D throws, use a heavy duty servo arm (JRPA215 for JR Servos.)



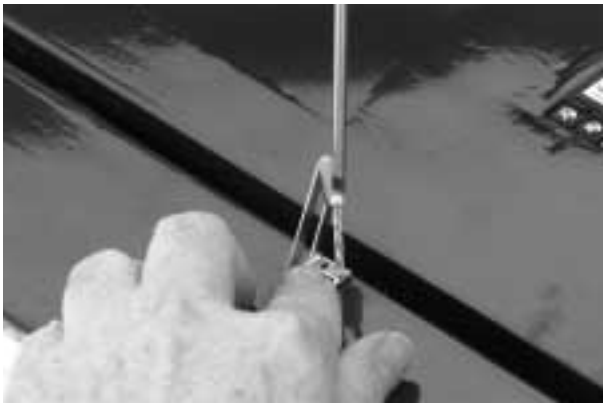
Step 5. Once you are satisfied with the metal control horn location (it should be a straight line from the servo arm to the horn), mark the location of the screw holes with a felt-tipped pen or pencil. The hinge line and the control rod should be at 90-degree angle to achieve proper mechanical efficiency.

Section 4: Installing the Aileron Linkage

CONTINUED

Step 6. Use a 3/32" drill bit to drill the screw holes for mounting the control horn. We suggest you apply a thin coat of CA into the aileron through the drilled holes help stiffen the balsa in the mounting area.

Step 7. Attach the control horn to the aileron using four screws and the plastic plate. Be careful not to accidentally puncture the covering with the screwdriver. We suggest putting masking tape around the horn area to help protect it from dents or scrapes.



Step 8. Repeat the process for the other aileron on the other wing panel.

Note: The control horn mounting screws may be excessively long on some control surfaces, and you may wish to cut off the excess using a Moto-tool and cut-off wheel. Leave a minimum of 1/8" of mounting screw above the plastic plate.

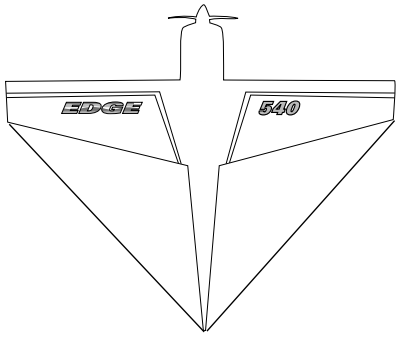
Section 5: Mounting the Wing to the Fuselage

Parts Needed	Tools and Adhesives Needed	
• Wing • Fuselage • Wing hold down hardware	• Hobby knife with #11 blade • 30-minute epoxy • Epoxy brush • Mixing stick • Rubbing alcohol • Felt-tipped pen or pencil	• Pliers • Ruler • Drill • Drill bit, 1/4" • Round file

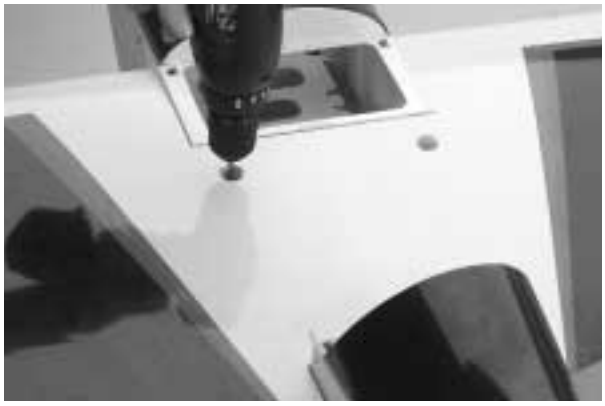
Step 1. Locate the forward mounting bolt holes in the wing. Trim the covering from the mounting bolt holes with a sharp hobby knife

Step 2. Place the wing onto the fuselage. Use care as the first few times the wing is inserted, the fit is snug. Note the tolerance between the wing and the fuselage. There is little movement of the wing once it is in the fuselage wing saddle area. You can check the alignment of the wing to the centerline of the fuselage by making a reference mark at the tail of the fuselage, then measuring each wing tip to make sure the wing is aligned.

Step 3. With the wing centered in the fuselage wing saddle area, secure it with masking tape so it will not move from side to side. Measure from wing-tip to the center of the fuselage at the rear. When you are satisfied with the alignment then proceed.



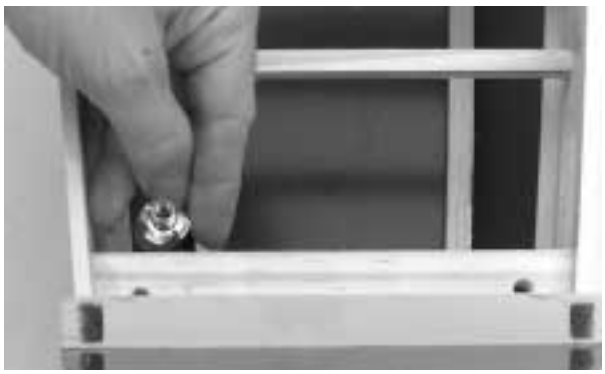
Step 4. Using the front wing bolt holes as a guide, drill through the wing and plywood wing support in the fuselage with a 1/4" drill bit. Drill 90 degrees to the centerline of the wing chord.



Step 5. Use the holes in the top wing bolt plates at the trailing edge of the wing as a guide to drill two holes into the plywood wing support at the rear of the hatch area in the fuselage. Again, drill at 90 degrees to the wing chord line.

Step 6. Remove the wing from the fuselage. Trial fit the blind nuts into position under the fuselage plywood wing supports at the front and back of the fuselage hatch opening. Use pliers with an adjustable opening to squeeze the blind nuts into position so the "teeth" penetrate the wood and stay in place.

Note: It is a good idea to place a piece of scrap wood on the top side of the plywood wing hold down blocks when pressing the blind nuts into place.



Section 5: Mounting the Wing to the Fuselage

CONTINUED

Step 7. Once the blind nuts are in place, trial fit the wing onto the fuselage and insert the nylon mounting bolts. Tighten enough to hold the wing in place but do not completely tighten. Check the alignment of the wing to the reference point on the fuselage again as done in Step 2. When you are satisfied with the alignment, tighten securely. Remove the bolts and wing. Apply some 30-minute epoxy to the blind nuts to secure them.

Section 6: Installing the Tail

Parts Needed	Tools and Adhesives Needed
• Fuselage • Wing • Horizontal stabilizer with elevators • Vertical stabilizer with rudder	• Thin CA glue • CA Remover/debonder • 30-minute epoxy • Epoxy brush • Mixing stick • Hobby knife with #11 blade • Straight edge (36") • Felt-tipped pen or pencil • Masking tape • Rubbing alcohol • Paper towels • Ruler • 90-degree triangle

Step 1. On the rear of the fuselage, carefully remove the tape holding the shaped fairing blocks onto the fuselage. Note they are in two separate pieces and fit over the horizontal stabilizer and around the vertical stabilizer.

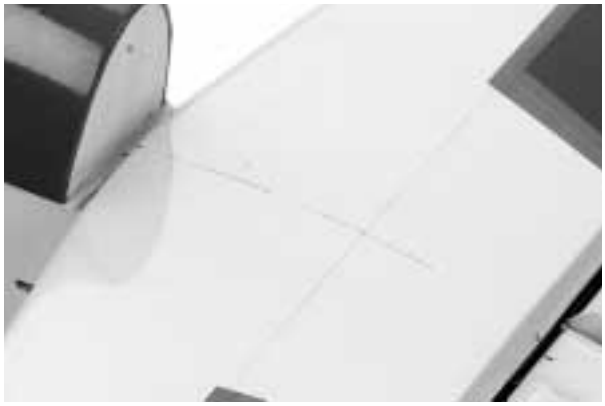
Section 6: Installing the Tail

CONTINUED

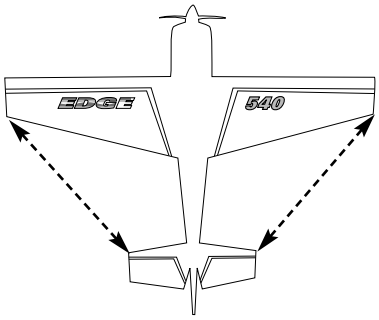
Step 2. Trim away the covering over the elevator and rudder linkage openings on both sides of the fuselage at the tail. Look carefully, and you will see the slots. Trim away the covering using a sharp hobby knife.

Step 3. Carefully remove any the tape holding the elevators to the horizontal stabilizer and remove the elevators. Measure the center of the fuselage at the forward bulkhead where the front of the horizontal stabilizer will rest, and the plywood plate at the rear or the fuselage. Using a ruler, mark the center line of the horizontal stabilizer

Step 4. Trial fit the horizontal stabilizer onto the rear of the fuselage. Install the elevators to check the distance between them and the rear of the fuselage to make sure there is no binding. Note that the fit is very close. Use masking tape to hold the horizontal stabilizer in place while making measurements. Check to see if the elevators will function without binding when the horizontal stabilizer is centered on the marks made in Step 3.



Step 5. Attach the wing and measure from the front tips of the horizontal stabilizer to the wing tips. Each should be the same distance from the wing. Make any adjustments necessary to make sure the horizontal stabilizer is aligned with the wing.

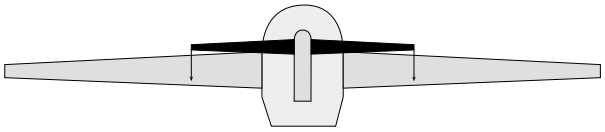


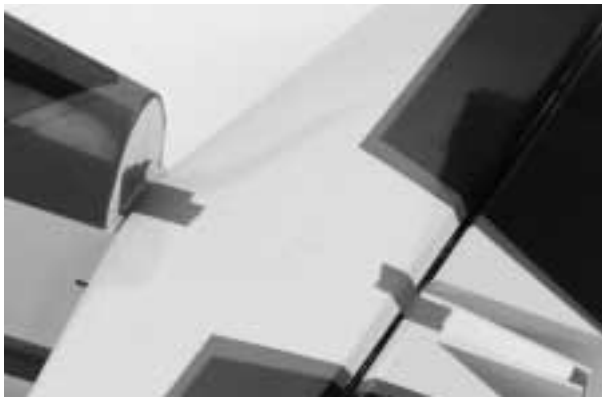
Step 6. When you are satisfied with the position of the horizontal stabilizer, use a felt- tipped pen or pencil to mark the bottom of the horizontal stabilizer next to the fuselage. Remove the horizontal stabilizer and trim away the covering 1/8" inside the marks you made. **Being very careful no to cut or even score the balsa wood below the covering.** This will provide for a more secure epoxy joint when the horizontal stabilizer is epoxied to the fuselage.

Step 7. Reinstall the wing and mix approximately 2 ounces of 30-minute epoxy. Apply the epoxy to the tail where the horizontal stabilizer will be mounted and to the bare wood of the horizontal stabilizer. Reposition the horizontal stabilizer to the fuselage,

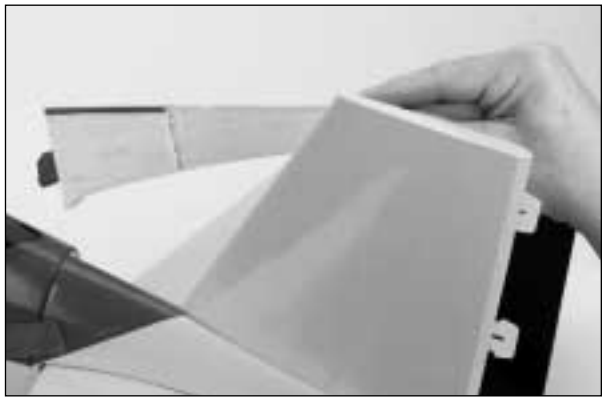
Section 6: Installing the Tail

making sure you align it with the reference marks made previously. Then align the stab so that it is square with the wing when sighted from the front. Wipe away any excess epoxy with rubbing alcohol and a paper towel. Be sure there is no epoxy in the area where the two tail pieces will go. Hold in position with masking tape. Allow the epoxy to cure.





Step 8. Carefully remove the tape holding the rudder to the vertical stabilizer. Trial fit the vertical stabilizer to the fuselage and trial fit the two fin fairing blocks. Some trimming of the fairing blocks may be necessary to obtain a good fit. Hold in place with masking tape.



Mark the position where the vertical stabilizer meets the tailpieces with a felt-tipped pen or pencil. The mark should leave a slight indentation in the covering. Carefully remove the vertical stabilizer and tail pieces. Remove the covering 1/8" from where you made the marks, using the procedure as described in Step 6.

Caution: Do not cut into the wood below the covering. This will weaken the structure.

Step 9. Mix approximately 1 ounce of 30-minute epoxy and apply to the vertical stabilizer and tail post where it contacts the fuselage and horizontal stabilizer. Be sure to apply epoxy to the base of the vertical stabilizer. Insert the vertical stabilizer into the fuselage tail area and wipe away any excess epoxy with rubbing alcohol and a paper towel

Step 10. Mix approximately 1 ounce of 30-minute epoxy. Apply epoxy to both fairing blocks and mount to the horizontal and vertical stabilizers. Wipe away any excess epoxy. Use masking tape to hold the two fairing blocks in place.

Section 6: Installing the Tail

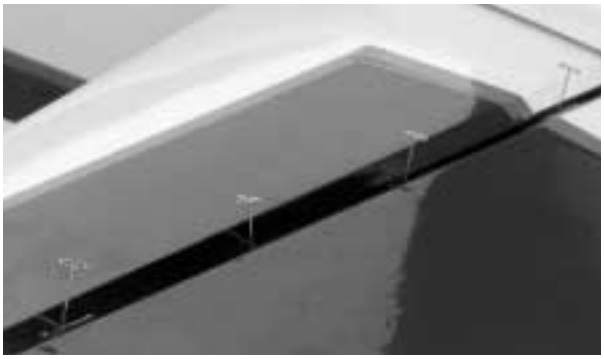
CONTINUED

Step 11. Carefully check the alignment of the vertical stabilizer to the horizontal stabilizer. A 90-degree triangle is helpful here. Use masking tape to hold the components in alignment. Allow the epoxy to dry completely cured.

Section 7: Hinging the Horizontal Stabilizer and Elevator(s)

Parts Needed	Tools and Adhesives Needed
• Fuselage with Vertical and horizontal stabilizers attached • Elevators (2)	• Thin CA glue • CA remover/debonder • Paper towels • T-pins

Step 1. Locate the elevator and hinges. Carefully remove the tape holding the elevators in place. Fit the elevators into the proper position on the horizontal stabilizer, using the same hinging techniques learned in Section 1. Check to make sure there is no binding of movement.



Step 2. With one elevator half properly aligned (left and right), apply thin CA glue to the hinges on both sides (be sure to remove the t-pins first). Wipe away any excess CA with CA debonder and a paper towel.

Section 7: Hinging the Horizontal Stabilizer and Elevator(s)

CONTINUED

Step 3. After the hinges are dry, check that they are securely in place by trying to pull the elevator from the horizontal stabilizer.

Caution: Use care not to crush the structure.

Step 4. Repeat steps 1-3 for the other elevator half

Step 5. Work the elevators up and down several times to "work in" the hinges and check for freedom of movement.

Section 8: Hinging the Rudder and Installing the Tail Wheel

Parts Needed	Tools and Adhesives Needed	
• Rudder	• Thin CA glue	• Drill bits: 1/16", 3/32"
• Fuselage	• CA remover/debonder	• Needle-nose pliers
• Tail wheel assembly	• Threadlock Z-42	• Hobby knife with #11 blade
	• 30-minute epoxy	• Felt-tipped pen or pencil
	• Mixing stick	• Paper towels
	• Epoxy brush	• Rubbing alcohol
	• Drill	• Masking tape

Step 1. Trial fit the rudder in position on the Vertical Stabilizer with the hinges in place.

Step 2. Insert the tail wheel wire into the pivot bushing. With the pivot bushing resting against the bend in the tail wheel wire, use a needle-nose pliers to make a 90-degree bend in the direction shown below in step 3, 1/8" above the top of the pivot bushing.

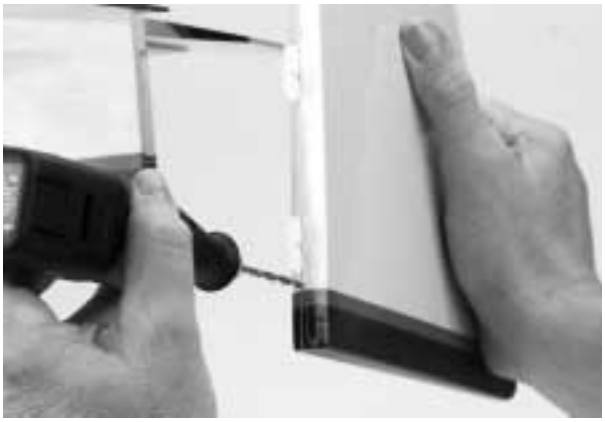
Note: The part of the tail wheel wire that inserts into the rudder must go into the wood in the rudder. To insure adequate strength, the bend of the wire must be kept as low as possible.

Section 8: Hinging the Rudder and Installing the Tail Wheel

CONTINUED

Step 3. Hold the tail wheel assembly up to the fuselage in a position where it's flush with the fuselage bottom. Note where the wire rests in reference to the rudder. Use a felt- tipped pen or pencil to mark the position where the hole for the wire is to be drilled into the rudder. Also mark the position of the slot for the pivot bushing will be located in the rear of the fuselage.

Step 4. Remove the rudder from the vertical stabilizer. Use a 3/32" drill bit to drill a hole in the exact center of the rudder as marked for the tail wheel wire to be inserted in the rudder. Drill a 1/16" pilot hole first.



Step 5. Using a hobby knife or a Moto-tool, cut a slot or groove into the back of the fuselage vertical stabilizer as marked in Step 3. This groove will be used to accept the tail wheel pivot bushing.

Step 6. Trial fit the tail wheel assembly and rudder in place with the hinges. Deflect the rudder, making sure the tail wheel turns freely with the rudder and there is no binding.

Step 7. When you are satisfied with the fit, disassemble the rudder and tail wheel assembly. Mix approximately 1 oz of 30-minute epoxy and apply to both the pivot bearing, the slot for the pivot bearing and in the hole for the tail wheel wire to be inserted into the rudder. You can use masking tape to hold in place while the epoxy cures. With the hinges in place, reassemble the tail wheel assembly and rudder. Wipe away any excess epoxy with alcohol and a paper towel. Allow the epoxy to cure completely before gluing the rudder hinges with CA.

Section 8: Hinging the Rudder and Installing the Tail Wheel

CONTINUED

Step 8. With the rudder aligned (up and down), apply thin CA glue to the rudder hinges on both sides of the rudder, using the same technique used in Section 1. Wipe away any excess CA with CA remover/debonder. After the hinges are dry, check that they are securely in place by trying to pull the rudder from the vertical stabilizer and fuselage. There should be a minimal gap ($^1/_{64}$") between the rudder and the vertical stabilizer.

Step 9. Work the rudder right and left. Check for free movement and ensure that the tail wheel tracks accordingly.

Step 10. Slide the tail wheel onto the wire. Next, slide the wheel collar onto the wire and tighten the screw in the wheel collar using the hex wrench provided. Use Locktitej® Z-42 to secure the wheel collar screw in place.

Note: The wheel must rotate freely with only a small amount of side play. It may be necessary to drill out the tail wheel slightly so the wheel will spin freely on the axle.

Section 9: Installing the Control Horns

Parts Needed	Tools and Adhesives Needed	
• Standard/reverse control horns (2 each, 4 total) • Plastic plates (3) • Screws (12) • Fuselage with rudder and elevators installed	• Standard screwdriver • Thin CA glue • CA debonder/remover • Paper towel • Drill	• Drill bits, 1/16", 3/32" • Ruler • Felt-tipped pen or pencil • Masking tape

Step 1. Locate a standard and reverse control horn and the associated hardware. Note that on the bottom of the control horn, the one with no markings is the standard horn and the one with the "R" is the reverse control horn. The right (as relates to the pilot sitting in the cockpit) elevator uses the standard horn, the left elevator uses the reverse horn.

Step 2. It will be helpful to turn the aircraft upside down. For illustration purposes we will describe installing the control horn on the right elevator first (as relates to the pilot sitting in the cockpit). Measure 1/2'' out from the fuselage and mark.

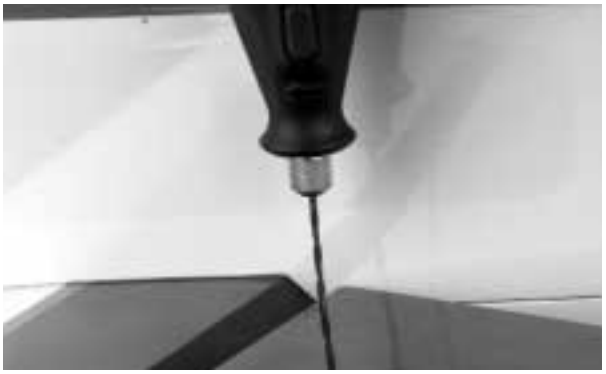
Section 9: Installing the Control Horns

CONTINUED

Step 3. Locate the standard control horn. Trial fit the horn on the elevator with the flat part towards the tip of the elevator and the part that connects to the clevis being closer to the fuselage.

Step 4. Line up the inside edge of the horn with the edge of the elevator and the mark you made in step 2. Make sure the horn is centered on the wood frame of the elevator. Mark the screw holes with a felt-tipped pen or pencil.

Step 5. Using a 1/16" drill bit, drill four holes for the horn. After the pilot holes are drilled, you can use the 3/32" bit to complete the process. After the holes are drilled, apply thin CA glue to the holes and area around the holes to help strengthen the balsa of the elevator. Allow the CA to dry, then re-drill to clear any obstruction caused by the glue. Caution: The balsa is soft so be sure to use CA to strengthen the mounting of the control horn.



Step 6. Carefully install the screws and engage the plastic plate on the other side. We suggest you cover the area with masking tape around the horn to prevent damage to the covering if the screwdriver slips. Once the right elevator control horn is installed, repeat the process for the left elevator.

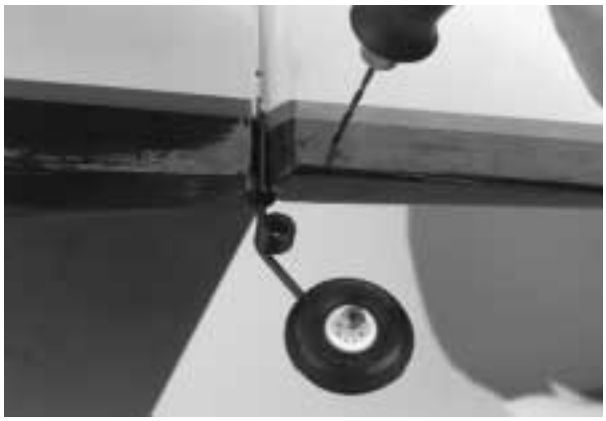
Step 7. Locate a standard and reverse control horn, four screws, and one plastic plate. The reverse "R" control horn is installed on the right side of the rudder (as if you were sitting in the cockpit). The standard control horn will be mounted on the left. These make up the rudder pull-pull control horns. They are located up from the bottom of the rudder along the edge of the red trim and the front edge is flush with the bevel. Mark the location with a felt-tipped pen or pencil. Trial fit one horn and make sure the location does not interfere with the tail wheel wire that was inserted into the rudder.

Step 8. Once you are satisfied with the location, mark the screw holes with a felt-tipped pen or pencil.

Section 9: Installing the Control Horns

CONTINUED

Step 9. Drill the holes using the same technique as described in step 5. Use caution not to damage the covering.

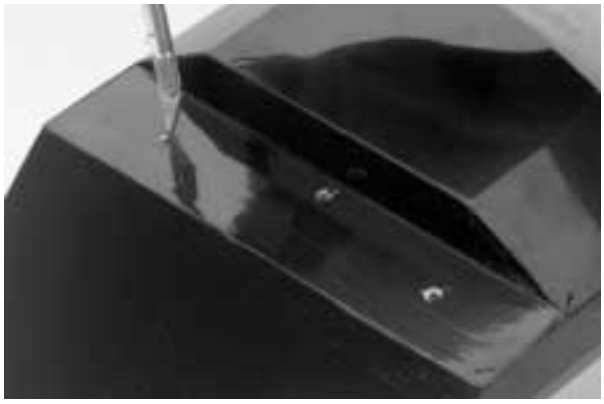


Step 10. Mount the two horns on the rudder, one on either side, with the standard horn on the left side and the reverse horn on the right side. The plastic plate will be used as a retainer on one side. Use caution when screwing in the screws so that the covering is not damaged if the screwdriver slips.

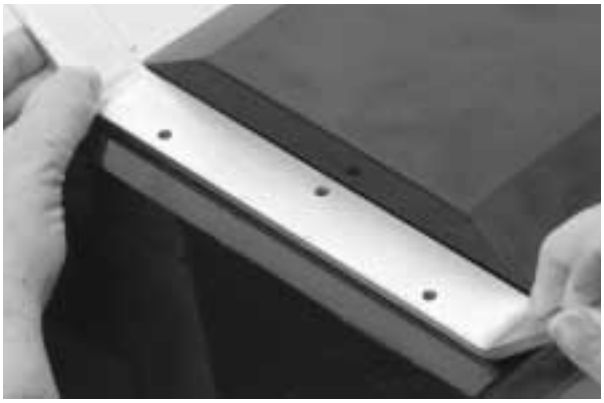
Section 10: Installing the Main Landing Gear

Parts Needed	Tools and Adhesives Needed
• Fuselage • Main landing gear • Mounting hardware	• Hobby knife with #11 blade • Phillips screwdriver • Felt-tipped pen or pencil • Locktite® Z-42

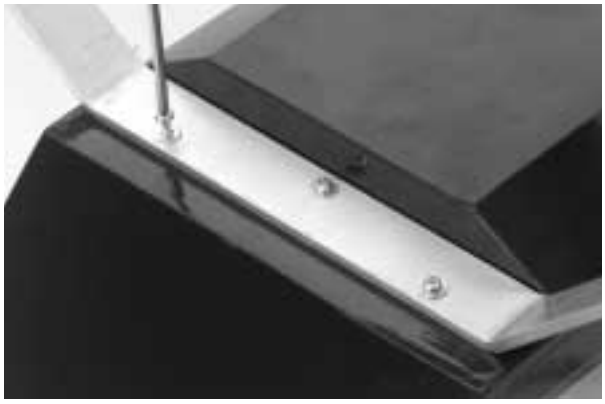
Step 1. Locate the three mounting holes for the landing gear on the forward part of the bottom of the fuselage. Look carefully as the covering may make it difficult to find them. The blind nuts are already mounted inside the fuselage. Use a hobby knife and remove the covering from the mounting holes.



Step 2. Trial fit the aluminum main landing gear over the holes in the fuselage.



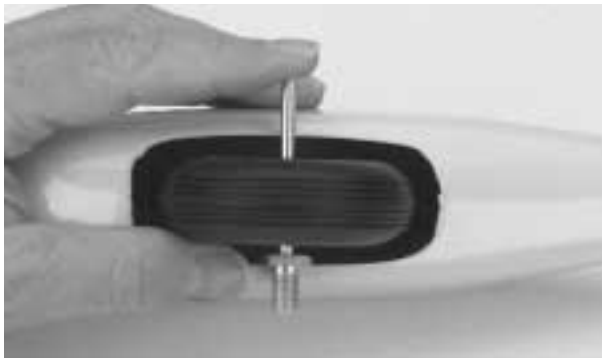
Step 3. Using the hardware provided, mount the main landing gear to the fuselage. Apply Locktite Z-42 to the threads of the screws to help secure them to the blind nuts in the fuselage.



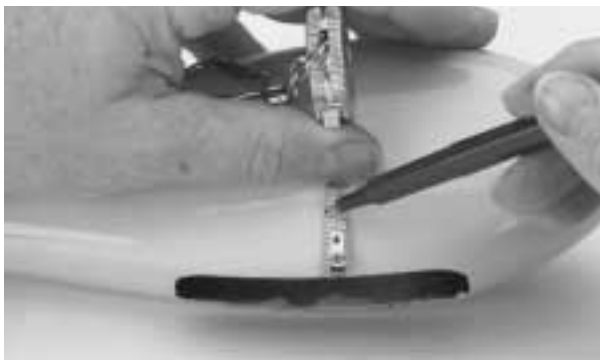
Section 11: Assembling and Mounting the Wheel Pants

Parts Needed	Tools and Adhesives Needed
• Wheel pants • Wheels (2) • Main landing gear • Mounting hardware package	• Ruler • Phillips screwdriver • Drill bits: 1/4", 3/32", 1/8", 1/2" • Drill • 30-minute epoxy • Epoxy brush • Mixing stick • Rubbing alcohol • Paper towel • Round file (fine) • Sandpaper (medium) • Felt-tipped pen or pencil

Step 1. Locate the two wheel pants and associated hardware, including the two $1\frac{1}{8}$" square plywood pieces that go inside the wheel pants. Slide one wheel onto an axle and position them so they are centered over the wheel opening in one of the wheel pants. Use a felt-tipped pen or pencil to mark the center location of the wheel on each of the wheel pants. This mark will be used as the reference point for marking the mounting holes for the landing gear on the wheel pant.



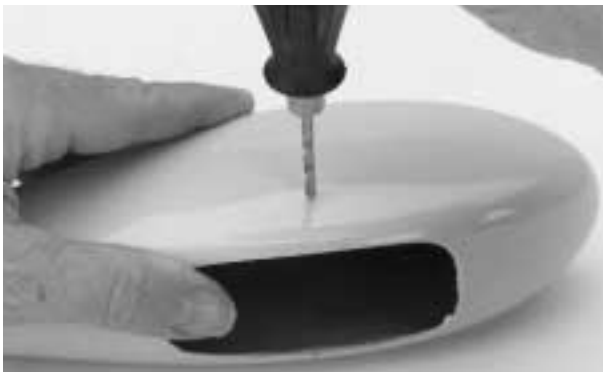
Step 2. Locate the hole for the wheel axle 5/8" measured up from the bottom of the wheel pant centered on the mark made in Step 1. Mark with a felt-tipped pen or pencil. Repeat the procedure for the other wheel pant. Notice which side of the wheel pant goes against the landing gear before making your mark.



Note: It is sometimes helpful to remove the main landing gear from the fuselage to make these markings and adjustments called for in the following steps.

Step 3. Trial fit the wheel pant on the landing gear and note the location of the main axle. Note the aluminum landing gear has a large hole (for the axle) and a smaller hole above it. This smaller hole will be used to secure the wheel pant in the proper position relative to the fuselage. Do not mark the small hole yet.

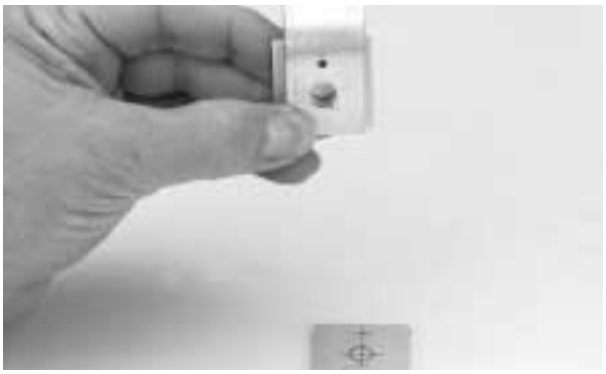
Step 4. Drill the main axle hole using a 1/2" drill bit. It is helpful to start with a 1/8" pilot hole first. Once the hole is drilled, trial fit the axle to the opening again. You may have to enlarge the hole further. Use a fine round file to make final adjustments to the opening. Repeat the process for the other wheel pant. Be sure to drill on the opposite side of the other wheel pant.



Step 5. Locate the two plywood square pieces included with the wheel pants. These will be epoxied inside the wheel pants as a reinforcement for mounting the wheel pant to the landing gear. Using the landing gear as a template, mark the plywood squares: one for the large axle hole and the other small hole that will be used by the 4-40 bolt and blind nut to hold the wheel pant in position.

Section 11: Assembling and Mounting the Wheel Pants

CONTINUED



Step 6. Use a 1/4" drill bit and a 1/8" drill bit to drill out the holes in the plywood squares for the axle and 4-40 bolt. Use caution that you do not split the wood.

Step 7. Mix approximately 1 ounce of 30-minute epoxy. Epoxy both plywood pieces to the inside of each wheel pant, making sure the epoxy does not clog the openings in the wheel pant that were drilled. The smaller hole will have to be drilled out later.

Step 8. Locate the axle, lock nut, wheel, and two wheel collars. Mount both axles to the landing gear using the large lock nuts. Once mounted, you will have to trim each axle using a Moto-tool and a cut-off wheel. Use caution when cutting the axles and wear protective goggles.

Step 9. The wheel pant can be trial fitted to the landing gear/axle. You may find you will have to open up the large axle hole a bit with a round file due to epoxy seeping into the opening. Adjust the wheel pant in reference to the bottom of the fuselage so the bottom of the wheel pant is parallel to the bottom of the fuselage. When you are satisfied with the alignment, mark the small hole opening onto the wheel pant.This mark can be made by passing a small drill bit through the hole and marking the surface of the wheel pant. Remove the wheel pant and drill a 3/32" hole in the wheel pant as marked.

Step 10. Repeat Step 9 for the other wheel pant.

Step 11. Epoxy a 4-40 blind nut into the small hole drilled in the wheel pant /plywood brace inside the wheel pant. Allow the epoxy to cure completely before attempting to tighten the bolt down.

Step 12. Mount the wheel pant to the axle and screw in the 4-40 bolt into the small hole above the axle, so that it screws into the blind nut. Before tightening the 4-40 bolt, slide on a wheel collar, the wheel, and another wheel collar onto the axle.

Step 13. Tighten down the 4-40 bolt to secure the wheel pant to the landing gear. Position the wheel in the center of the wheel pant opening, and retain it there by positioning the two wheel collars (on either side of the wheel) so that the wheel is kept in the center of the wheel pant opening. Tighten both wheel collar screws snugly once the wheel is properly positioned.

Note: A drop of Locktite® Z-42 on the wheel collar screws will help keep them from coming lose during operation. Repeat the process for the other wheel.

Section 12: Installing the Engine

Parts Needed	Tools and Adhesives Needed
• Fuselage • Metal motor mounts • Mounting hardware • Engine • Spacer Plate (If using MDS 1.48)	• Phillips screwdriver • 30-minute epoxy • Rubbing alcohol • Epoxy brush • Mixing stick • Paper towel • Locktite® Z-42

Step 1. Mix approximately 1 ounce of 30-minute epoxy and an equal amount of rubbing alcohol. Brush the mixture on the firewall (and spacer plate) to seal it to make it fuelproof. Allow the epoxy to cure completely.

Step 2. Locate the two metal motor mounts and associated mounting hardware. Note the motor mount screw holes are shaped like slots in the firewall. This is to allow moving the motor mounts closer or further apart so engines of different width crankcases can be mounted. Note also that the motor mount can only be installed so the engine cylinder faces to the right side of the aircraft, as seen from the cockpit of the model.

Step 3. Mount the metal motor mounts on the firewall using the bolts and washers provided. The blind nuts are installed on the inside of the fuselage. Do not over tighten the bolts at this time, as the width of the mount will vary with the size of the engine crankcase used.

Step 4. Trial fit your engine on the motor mount by mounting it loosely to metal motor mount with the 4 bolts, 8 washers, and 4 nuts provided. Adjust the distance between the metal motor mounts until the engine crankcase fits the motor mount. Check the metal motor mount position on the firewall, making sure the mounts are parallel to the bottom of the firewall. Once the proper distance between the motor mounts is determined and they are parallel to the bottom of the firewall, tighten the bolts mounting the motor mount to the firewall securely. A drop of Locktite Z-42 on the bolt threads will help prevent loosening in flight.

Step 5. Position the engine along the metal motor mount until you measure 6 1/4" from the firewall to the front end of the prop drive hub.

Note: If a shorter engine is used, such as MDS 1.48, the 3/8'' plywood spacer plate must be used behind the motor mounts.

Once the engine is in proper position, tighten down the motor mounting bolts securely. Again, a drop of Locktite Z-42 will help prevent loosening of the bolts in flight. The engine should be positioned so there is ample clearance in the cowling for the spinner backplate mounted to the prop drive shaft. If you remove the engine and reinstall it, make sure the engine is mounted at the distance previously mentioned. Remember, the key distance is from the prop drive hub to the firewall.

Section 13: Assembling and Installing the Fuel Tank

Parts Needed	Tools and Adhesives Needed
• Clunk (Fuel Pickup) • Tube (vent) • Tube (fuel) • Silicon fuel tubing • Fuel tank • Plastic cap (large) • Plastic cap (small) • Rubber stopper • 3 mm screw • 3 mm nut	• Hobby knife with #11 blade • Phillips screwdriver • Tubing bender (optional) • Tubing cutter (optional)

Step 1. Locate the fuel tank parts.

Step 2. Locate the rubber stopper. Insert on of the tubes into an open hole in the stopper so an equal amount of tubing extends from each side of the stopper. This tube will be the fuel pickup tube that provides fuel to the engine. Slide the smaller plastic cap onto the tube at one end, so that the three tabs will face inside the tank. (These tabs will hold the 3mm nut in place later.) Slide the large plastic cap over the tube and against the rubber stopper. It should be orientated so that the "raised center" faces away from the stopper.

Step 3. Locate the other tube. This will be the vent tube. Bend one end up about 60 degrees but no more than 90 degrees.

Caution: You can use your fingers to bend the tubing, but be careful not to kink the tubing. If you have access to a small tubing bender, use it to make the bend. Refer to photo below.

Step 4. Slide the vent tube into the other open hole in the stopper and caps.

Note: An option is to trim the length of the vent and fuel pickup tubes with a tubing cutter. This makes a neater job.

Section 13: Assembling and Installing the Fuel Tank

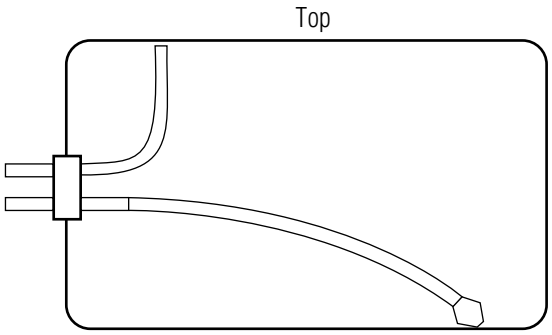
CONTINUED

Step 5. Locate the piece of silicone fuel tubing and metal clunk. This tubing will be attached to the clunk making up the fuel pickup inside the tank. Insert the metal clunk into one end of the fuel tubing.

Step 6. Install the open end of the fuel tubing onto the fuel pickup tube.

Step 7. Insert the 3 mm screw into the raised portion of the large plastic cap. Place the 3mm nut into the raised slots on the small plastic cap. Compress the caps/stopper together and screw the 3 mm screw into the nut. Tighten just enough to hold the assembly together.

Step 8. Carefully insert the stopper into the fuel tank. Position the stopper so the vent tube is pointing to the top of the fuel tank. The vent tube must point to the top of the tank for the fuel system to function properly. Also, move the tank around and up and down to observe the movement of the clunk. It should move freely, and not hit the back of the fuel tank. The fuel clunk must be free to move, regardless of what attitude the aircraft takes, thus ensuring it is in the fuel at all times. If the clunk does not move freely, trim a portion of the fuel tubing to shorten the length and try again.



Step 9. When you are satisfied with the movement of the clunk, and the vent tube is properly positioned to point to the top of the tank, tighten the 3 mm screw so the caps move toward each other and compress the rubber stopper in the tank stopper opening. This compression will help seal the stopper into the tank opening.

Important: You should mark which tube is the vent and which is the fuel pickup when you attach fuel tubing to the tubes in the stopper. Once the tank is installed inside the fuselage, it may be difficult to determine which is which.

Step 10. Wrap the fuel tank in foam. This is done to provide support for the fuel tank, and help reduce vibration. Attach fuel tubing the tank tubes and feed the tubing through the hole in the firewall as you slide the fuel tank into the area behind the firewall in the fuselage. You will note two “C” shaped slots in the plywood floor behind the firewall. Rubber bands are slipped into these “C” shaped slots around the fuel tank, thus holding it firmly in place.

Note: Remove the fuel tank when drilling the hole for the throttle linkage to prevent accidental puncturing of the fuel tank.

Section 14: Installing the Radio

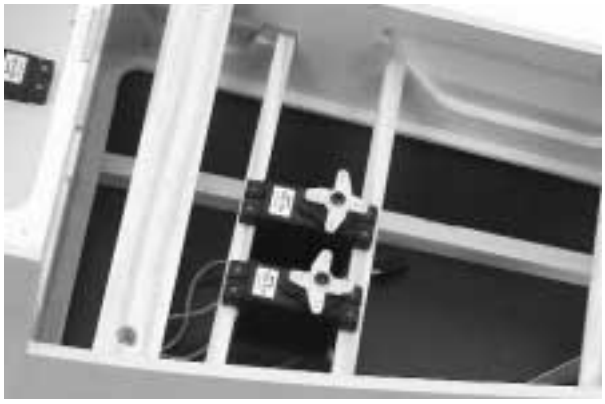
Parts Needed	Tools and Adhesives Needed
• 4-channel radio system with 5 servos and hardware • Radio packing foam • Antenna tube (HAN112) (optional) • Switch	• Drill • 1/16" drill bit • Phillips screwdriver • Hobby knife with #11 blade • Felt-tipped pen or pencil • 6-minute epoxy • Rubbing alcohol • Paper towels • Mixing stick • Epoxy brush

Step 1. Locate the plywood servo rail (5/16 x 7 3/4"). It will go in front of the servo rail already installed in the fuselage. Note the "U" shaped notch in the fuselage sides for placement of the servo rail. Trial fit the servo rail in place, with the rudder and elevator servos in place. When you have determined the proper spacing, mark the location of the rail to the fuselage sides with a felt-tipped pen or pencil. Remove the servos. Mix approximately 1/4 ounce of 6-minute epoxy and apply to the servo rail and fuselage sides at the "U" location. Allow the epoxy to cure completely.

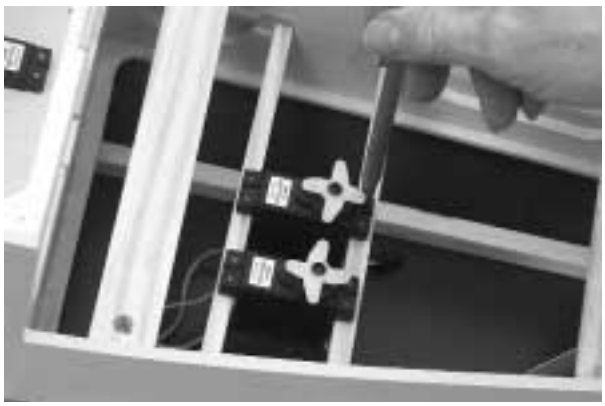
Step 2. Locate the throttle servo and install the grommets and eyelets per the instructions included with the radio. Do the same for the rudder and elevator servos. Position the throttle servo in the opening in the plywood floor near the fuel tank. Orient the servo so the servo arm is toward the front of the fuselage.

Step 3. Install the rudder servo on the servo rails next. Place it so it is in the center of the fuselage, with the servo arm facing toward the rear of the fuselage. The rudder servo uses a pull-pull linkage so leave ample room between its servo arm and that of the elevator servo arm. Install the elevator servo next, placing it to the left (as if one were sitting in the cockpit of the aircraft) of the rudder servo. Make sure there is ample room between the two servo arms.

Note: We recommend 1 1/4" servos arms for the rudder and elevator. If you are going to use 3-D throws, Hangar 9 offers a variety of heavy duty gold-anodized machined aluminum servo arms for 3-D flying. (HAN3576-3579)



Step 4. Once you're satisfied with the servo's location, use a felt-tipped pen/pencil to mark the mounting holes for all three servos.



Section 14: Installing the Radio

CONTINUED

Step 5. Remove the servos and drill the 12 holes using a $^{1}/_{16}$" drill bit. Remount the servos and screw in the mounting screws provided with the servos.

Step 6. Use radio packing foam (available at your local hobby shop) when you install the receiver and battery pack. There is ample room for the receiver and battery in the forward part of the fuselage, in the area above and behind the fuel tank. Wrap the battery and receiver in foam and install them into the fuselage.

Receiver Installation

Receiver Battery Installation

Note: We wrapped the battery in foam and attached it to the plywood above the fuel tank directly behind the firewall platform using Velcro®. For the receiver, we used a J-TEC Pillow Pack, attached Velcro to the plywood floor behind the fuel tank next to the throttle servo, and also attached the receiver Pillow Pack to the floor using velcro.

Step 7. Route the antenna back through the fuselage using an antenna tube (not included), or route it out the side of the fuselage, back toward the tail. Install the switch to the left side of the fuselage under the wing, as shown below.

Note: Trial fit the switch inside the fuselage to make sure you have proper clearance.

Section 15: Installing the Control Linkages

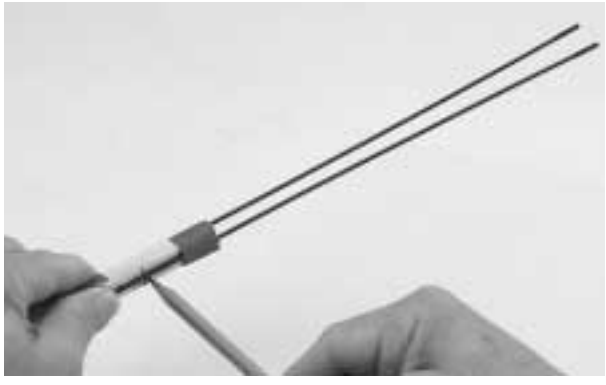
Parts Needed	Tools and Adhesives Needed
• Fuselage • Wood pushrod • Heat Shrink tubing • 12" x 4-40 rod – threaded on one end (2) • 6" x 4-40 rod – threaded on one end • 4-40 clevis w/clips (3) • 4-40 nuts (3) • 20" x 2 mm rod - threaded on one end with nylon clevis • .020 music wire 36" (2) • 2-56 clevis w/clips (4) • 2-56 threaded couplers (4) • 2-56 nuts (4) • Heavy-duty 1¼" servo arms for 3-D throws (optional)	• Hobby knife with #11 blade • Soldering iron • Silver Solder (Staybrite) • Needle nose pliers • 30-minute epoxy • Nylon string • Rubbing alcohol • Paper towels • Mixing stick • Drill • 1/8" drill bit

Step 1. The elevator linkage will be the first described. The components for the elevator control linkage consist of a wood pushrod, three threaded music wire rods, clevis w/clips, and a piece of heat shrink tubing. Since the Edge 540 uses a split (two-piece) elevator, you will construct a pushrod that has two threaded rods on one to connect to the elevator control horns and one threaded rod on the other end to connect to the elevator servo arm.

Step 2. Trim 2½" off of the wood pushrod before proceeding with the marking of the wire rod position. Make a mark 1½" from one end, of the wood push rod with a felt-tipped pen or pencil. Make a second mark 2" from the same end, but on the opposite side of the wood pushrod. On the other end of the wood pushrod, make a mark 1½" from the end, but make it 90 degrees from the other two marks. In effect you will have two rods at one end on opposite sides from each other, and at the other end the rod will be on the top/bottom side between the two.

Step 3. Use a 1/8" drill bit and drill the holes marked on the wood push rod. Round out the holes so the rods will fit flush against the wood push rod. A groove can be cut from the holes to the end of the wood push rod to help secure the rods in place when applying epoxy.

Step 4. Fit the two 12" threaded rods on either side of the wood pushrod along side the holes drilled. Position the rods so the threaded ends are the same distance from the end of the wood pushrod. Mark the rods at the 1½" and 2" hole positons.



Section 15: Installing the Control Linkages

CONTINUED

Step 5. Make a 90-degree bend at the opposite (unthreaded) end of each 12" rod at the positions marked in Step 4. Trim the bend section to a length of 1/8" to 3/16" (enough to fit in the hole in the wood pushrod but not extend beyond the hole).

Step 6. Trial fit the two long threaded rods into the hole on either side of the wood pushrod (the 1½" and 2" marked end). Trim off any excess rod that projects beyond the hole. You may need to round out the holes slightly so the rods fit against the wood pushrod.

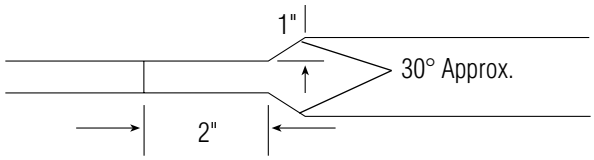
Step 7. When you are satisfied with the fit, mix approximately 1/4 ounce of 30-minute epoxy and apply to the holes and grooves of the wood pushrod. Install the rods into the holes and wrap securely with nylon thread. Coat with epoxy and allow to cure.

Step 8. Cut the heat shrink tubing into two equal pieces. Slip one onto the wood pushrod and threaded rods. Use a heat gun to shrink the tubing into place.

Step 9. If you have not cut out the openings for the elevator and rudder linkages on each side of the fuselage rear, now is the time to do so. They are located below the front of the horizontal stabilizer. Both slots are approximately 1" long. The elevator slot is approximately 1 3/8" below the front of the horizontal stabilizer, each side of the fuselage. The rudder pull-pull linkage opening is located directly below the elevator linkage slot, along the red trim line at the fuselage bottom.

Step 10. Slide the elevator pushrod through the hatch opening in the fuselage and into the tail section so that each rod exits at the rear of the fuselage, through the elevator linkage slots.

Hint: The elevator pushrod requires some bending of the threaded rods that pass through the fuselage rear. The illustration below gives an approximate idea of how to bend the rods so they would exit the fuselage.



Attach a nut and a clevis to each elevator threaded pushrod end. Screw in approximately 10 turns. Connect each clevis to the outer hole of each elevator control horn. Adjustments to each elevator position can be done by screwing the clevis in or out on the threaded rods. The clevis should be secured to the control horn with the metal clips provided with each clevis. This will prevent the clevis from opening in flight.

Step 11. With the pushrod attached to the elevators, adjust so each elevator half moves the same. Tape the elevators in the neutral position (centered to horizontal stablizer). Attach the 6" threaded rod to the other end of the wood pushrod, threaded end toward the elevator servo in the fuselage. Make sure the elevator servo arm is centered. Thread a nut and clevis on the threaded end of the 6" rod and adjust the rod so the servo arm is 90 degrees to the elevator push rod. Adjust the 6" rod's position on the wood pushrod until the correct length of the pushrod is determined, i.e., the elevators at neutral, the length of the 6" rod should form a 90-degree angle with the clevis attached and the servo arm centered. Once this length is adjusted by moving the 6" rod on the wood pushrod, mark where the 6" rod passes the hole that was drilled in that end of the wood pushrod.

Step 12. Remove the 6" rod and make a 90-degree bend at the mark made in step 11. Trim the bent end so it is 1/8" long. Remove the wood pushrod from the fuselage. Mix approximately 1/4 ounce of 30-minute epoxy and epoxy the 6" rod into the hole. Wrap with nylon thread. After the epoxy has cured, slip the heat shrink tubing over the rod and shrink using a heat gun.

Section 15: Installing the Control Linkages

Note Final adjustments to the elevators will be made later after completion of control linkage system.

Step 13. The pull-pull linkage consist of 2 cables; each has a .020 music wire, two threaded couplers, two clevis with safety clips, and two locking nuts. Make two cables.

Step 14. Scrape or clear the ends of the wires. Use a soldering iron and silver solder, to solder one of the threaded couplers to **one** end of the wire. The other end will be done later.

Note: It's important to bend over approximately 3/8" of the music wire onto itself at its ends using pliers. This will give a more secure mechanical solder joint as the silver solder has more to "grab onto" than a straight wire end.

Step 15. After the solder has cooled, check the security of the solder connection. Attach a locking nut and clevis onto the threaded coupler. Connect the clevis to the outer hole of the rudder control horn and thread the other end through the fuselage. Repeat the process for the other link. Trial fit the pull-pull linkage to the servo arm of the rudder servo, compensating for the fact there will be a threaded coupler and clevis attached.

Step 16. Once you are satisfied with the length, silver solder the threaded coupler to the music wire using the same procedure as outlined in step 15. After the solder has cooled, again check the security of the joint. Repeat the process for the other link.

Step 17. Once both pull-pull linkages have been constructed, connect to the rudder servo control horns outer holes. Final adjustments can be made at either or both ends of the linkage by screwing in or out the clevis as needed. Hangar 9 offers a varitey of heavy duty, gold anodized machined aluminm servo arms for use with 3D flying.

Step 18. Locate the threaded rod for the throttle (2 mm). With the engine mounted to the fuselage, mark where the throttle pushrod will exit the firewall. The linkage to the carburetor arm should be free of any binding during operation. Once the throttle pushrod position has been determined and marked, use a 1/8" drill bit to make the opening in the firewall. Be sure to remove the fuel tank before drilling.

Step 19. Begin the installation of the throttle linkage by attaching the nylon clevis to the threaded end of the rod (10 turns). Thread the throttle linkage through the firewall and attach the nylon clevis to the engine throttle control arm.

Section 15: Installing the Control Linkages

CONTINUED

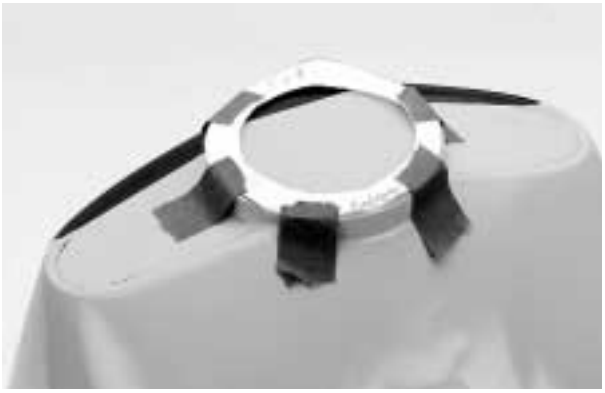
Step 20. Note where the throttle control linkage is in relation to the throttle servo arm inside the fuselage. You will need to make a "Z" bend at the end of the rod and attach it to the throttle servo arm. Make sure the engine carburetor barrel is in the 1/2 open position and the throttle servo arm is centered. Mark where the throttle linkage passes over the throttle servo arm. Use "Z" bend pliers to make a "Z" bend at the mark. Attach the throttle linkage to the servo arm (you may have to remove the servo arm to install the arm onto the "Z" bend, then reinstall the servo arm onto the servo).

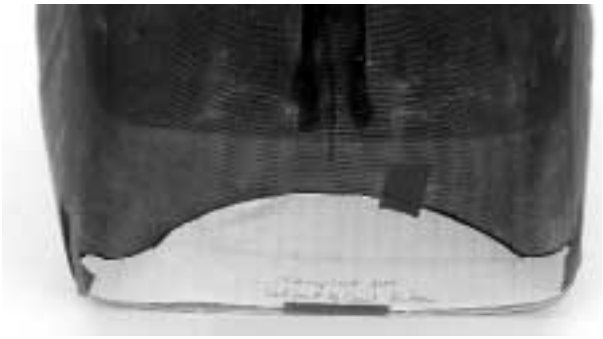
After connecting the throttle linkage to the servo arm, check again to make sure the throttle barrel is at 1/2 open position when the throttle arm centered and the transmitter throttle stick is at 1/2 throttle. This will allow for minor adjustments to the carburetor by screwing the nylon clevis in or out on the threaded rod.

Section 16: Attaching the Cowling

Parts Needed	Tools and Adhesives Needed
• Fiberglass cowl • 4-40 button head screws (4) • Red trim tape • Rubber grommets (4) • Fuel Dot (HAN115) (optional)	• Drill • 1/16" drill bit • Masking tape • Moto-tool with sanding drum • Carbide cutter • Sanding stick (medium) • Ruler • Felt-tipped pen or pencil

Step 1. Using a Moto-tool, grind out the prop and cooling openings in the front of the cowl. A template is provided for the prop opening. Next, cut out the large "U" shaped opening in the bottom of the cowl so it will slide over the fuselage and part of the landing gear. This will also allow for airflow and exhaust flow. A template for the cowl opening is also provided.





Step 2. Make a template of the cylinder head of the engine you are going to mount in the Edge 540. Mount the engine and place the template over it. Use a piece of cardboard or heavy paper that can be taped to the fuselage and folded back. Remove the engine, fold back the template and slide the cowl over the fuselage. Unfold the template so it rests on the cowl at the position where the engine cylinder will be located. Mark the cowl for the engine cylinder opening. The same process can be done to locate where the needle valve will exit the cowl.

Section 16: Attaching the Cowling

CONTINUED

Step 3. Use a Moto-tool and a carbide cutter to make the cylinder head and needle valve openings in the cowl.

Note: For illustration purposes, we have shown an MDS 1.48 glow engine mounted in the Edge 540. If you use a different engine, it will be necessary to make the appropriate template and mark the cowl to fit the engine you have.

Step 4. Mount the engine in the aircraft. Slide the cowl onto the fuselage. Trial fit the cowl to the engine installed. Mount the muffler and trial fit again. Make sure the engine is mounted so the prop drive hub is 6 1/4" from the firewall. This should provide an approximate 3/16" clearance between the cowl and the spinner backplate when mounted on the engine. Re-adjust the cowl or engine if necessary to obtain the proper clearance.

Step 5. Tape the cowl securely in position and check to make sure it fits correctly. There should be ample clearance (1/8" around the engine and muffler). Make sure the prop hub is centered in the opening in the cowl.

Step 6. There will be two-button head hold-down screws located on either side of the cowl. With the cowl in position, the top screw is located 1 1/2" from the edge of the cowl to the front, 1/2" down from the blue/yellow color line on the top of the cowl. The bottom screw is located directly below the top screw, 3 1/4" at a location 1 1/2" from the edge of the cowl and 3/8" up from the yellow/blue color line at the bottom of the cowl.

Step 7. Once the mounting holes have been marked, drill the holes on each side of the cowl using a 1/16" drill bit. Be sure to use masking tape to hold the cowl securely in position

Step 8. Remove the cowling and enlarge the four holes in the cowling just enough to fit the rubber grommets in place.

Note: On some engines where the carburetor is not easily accessible, a a fuel dot can be used. Hangar 9's gold anodize machined aluminum fuel dot with "T" coupler (HAN115) is an excellent choice and should be available at your local hobby shop.

Step 9. Align the cowling on the fuselage and secure it with the button head screws. Do not overtighten the screws by smashing into the rubber grommets, as this will take away the vibration isolation of the grommets.

Step 10. Self-adhesive red trim tape is provided for trimming the cowl.

Section 17. Mounting the Hatch (with/canopy)

Parts Needed	Tools and Adhesives Needed
• Fuselage with hatch • Canopy • Instrument panel decal • Pilot (optional) 1/4 scale (HAN8272) • 4 4-40 cap head screws • 4 # 4 flat washers • Blue canopy trim tape	• Scissors • Masking tape • Canopy Glue (Pacer 560) • 3/32" hex driver • Hobby knife with #11 blade

Step 1. Lift out the hatch and set aside for the moment. Note that the hatch has four tabs that slide into slots in the fuselage: two in front near the front bulkhead where the leading edge of the wing rests and two near the back of the wing rest area near the fuselage top turtledeck. The tabs already have the blind nuts installed to facilitate securing the hatch to the fuselage in flight.

Step 2. Locate the four bolt holes (two on either side of the fuselage, near the open tab slots of the fuselage). They will be covered by plastic, so you will have to look carefully for them. Once you have found the holes, cut the covering over them using a sharp hobby knife. The hatch cap screws will be installed later.

Step 3. Locate the instrument panel decal from the decal sheet. Cut the instrument panel out and trial fit it to the hatch area in the front area of the cockpit. When you are satisfied with the fit, peel away the backing and apply the instrument panel decal to the instrument panel area. Hangar 9 makes an optional instrument panel (HAN186) which can be used in place of the decal. Use Shoe Goo or Silicone® adhesive to secure it to the cockpit.

Step 4. If you plan on using a pilot in your Edge 540, now is the time to mount it to the cockpit floor area of the hatch. A 1/4 scale Civilian Pilot is suggested. (HAN8275)

Section 17. Mounting the Hatch (with/canopy)

CONTINUED

Step 5. Locate the canopy and note the trim lines. Carefully trim out the canopy using Lexan® scissors or regular scissors. Use care in cutting out the canopy.

Step 6. After cutting out the canopy, trial fit it to the hatch. Trim as necessary to make a proper fit.

Step 7. After confirming the fit of the canopy to the hatch, attach it to the hatch using canopy glue such as Pacer 560. Masking tape can be used to hold the canopy in place while the glue dries. Allow the canopy glue to dry at least 24 hours. Trim tape for the canopy can be applied now. (Blue trim strips are provided.)

Step 8. With the instrument panel, pilot (optional), and canopy mounted to the hatch, slide the hatch into the fuselage. Carefully screw in the four 4-40 cap screws and washers until the hatch is snug. Do not overtighten; the fuselage covering will be marred.

Section 18: Adding Decals

Parts Needed	Tools and Adhesives Needed
• Fuselage • Wing • Decal sheet	• Ruler • Scissors • Soft cloth • Masking tape (optional)

Step 1. Locate the decal sheet included in the kit. Use the box art photos as an approximate position reference for the application of the included decals.

Step 2. Using the box as a reference, cut out the decals for the cowl (Saito, JR) as applicable. If you are using a different engine or radio, you can apply decals applicable to the equipment you have. Apply the decals to the cowl and rub with a soft cloth to work out any bubbles or wrinkles.

Step 3. Next, apply the Hangar 9 decal to the wheel pants.

Step 4. The Aeroshelle decal can be applied to both sides of the fuselage turtledeck behind the canopy as shown in the photo below. The Edge 540 decal is placed on each side of the fuselage behind the hatch area.

Step 5. The IMAC and American Flag are applied to both sides of the vertical stabilizer and rudder as shown.

Step 6. The “Edge 540” decal is applied to the top of the wing, the “Edge” decal is applied to the left wing panel, and the “540” decal is applied to the right wing panel, centered and parallel to the red stripe. Refer to the photo below.

Section 19: Balancing the Edge 540

It is essential that Edge 540 be properly balanced before any attempt is made to fly the aircraft. Don't inadvertently neglect this step. The recommended C.G. (Center of Gravity) location for the first flights with the Edge 540 is 4 1/2"—5 1/4" from the leading edge of the wing, measured at the fuselage.

Mount the receiver battery inside the top of the motor box. If necessary, add weight to either the tail or nose until the correct balance is achieved. Stick-on weights are available at your local hobby shop and work well for this purpose.

Section. 20: Control Throw Recommendations

The following control throws offer a good place to start with for your first flights.

Set up the control throws for a standard rate for the first few flights, then increase the throws to your liking.

The 3-D rates allow the Edge 540 to perform the new generation of aerobatic maneuvers, such as waterfalls, elevators and harriers. However, they also make the model very sensitive. It is recommended that the 3-D rates be tried only after becoming familiar with your Edge 540.

When using 3-D rates, use 70% expo on elevators to keep the model controllable. Also be sure that adequate mechanical advantage is maintained when adjusting the elevator linkages for 3-D rates or flutter can occur.

	Standard Rate		3-D Rate	
Aileron				
Measured furthest inboard	up	down	up	down
	5/8"	9/16"	1 5/16"	1 1/16"
Elevator				
Measured furthest inboard	up	down	up	down
	9/16"	9/16"	3"	3"
Rudder				
Measured at the	Right	Left	Right	Left
Bottom of the Rudder	3 1/4"	3 1/4"	4 1/4"	4 1/4"

Setup and Flying

by Mike McConville

The Edge 540 performes well in both precision and wild 3-D aerobatics. The unique straight leading edge of the wing gives it extrodinary low-speed handeling. We've found this new Edge to fly as precise as a "Pattern" model and yet turn inside-out in 3-D manuevers.

Preflight

Before getting to the really fun stuff—flying— It's necessary reiterate some very important steps that were covered in the assembly instructions. For those of you who are veterans of larger models, this is old news. But to you new comers to the world of large models, this is **very** important info.

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:

Seal the aileron and elevator hinge gaps.
This should be considered part of finishing the model, and is as important as installing the fuel tank or battery pack. On large aerobatic models, this is absolutely necessary. Failure to do this may very well cause control surface flutter, and on a large model, this will most likely cause a crash. Putting safety and model preservation to the side, there are several other reasons to do this on an aerobatic model. It will increase the effectiveness of the control surfaces, and the model will track more true and precise. Hinge gaps sealed? CHECK!

Maintain the proper mechanical advantage on all control surface linkages.
Same as unsealed hinge gaps, this is often the 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 will cause flutter on the Edge. The recommended linkage setups are more than adequate to achieve full 3-D throws. That's straight off of the prototypes. Linkages are set? CHECK!

Never attempt to make full throttle dives!
Larger 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 Edge should be flown like a full-scale Edge. Throttle management is absolutely necessary. If the nose is down, the throttle comes back. CHECK!

The Prototype Model Setup

All of the recommended settings in this manual are a result of the flight testing on the prototype Edge. There are no secrets. If you follow the instructions and these tips, your Edge will be set up just like ours.

Although a computer radio is not mandatory, it is preferable in this model. We use Exponential on all controls to soften the feel around neutral. This makes it easier to fly smooth in precision maneuvers and also makes it less likely to over-control in 3-D mode. I use the following expo values: Elevator +38% Low Rate, +70% 3D Rate. Aileron +40% Low Rate, +55% 3D Rate. Rudder +25% Low Rate, +50% 3D Rate. Note that + expo values soften the neutral with JR radios. Other brand systems may require "-" (negative) expo values to soften the neutral.

My personal favorite powerplant is the Saito 1.80. I swing an APC 16 x 8 propeller, and 30% heli fuel for maximum power. This combination has proven to be totally unlimited and allows anything imaginable from torque rolls just a few inches off the ground to multiple vertical snaps.

Computer Radio Enhancements

A computer radio will allow you to do quite a bit of fine tuning of the feel of the Edge, which will make aerobatics even easier. Below are the programming enhancements I normally use to trim out an aerobatic model.

Differential Mixing
This is a great mixing feature of many computer radios that allows you to dial in the aileron differential, which is how the roll axis of the model is set. The best method for setting this is to use the Travel Adjust (ATV) of aileron and flap channels to set the up and down movement of each aileron exactly the same. Set it to the maximum throw of $1^{5}/_{16}$". Then set the differential by going to the appropriate screen in the radio and adjusting the differential value to reduce the down movement of each aileron to $1^{1}/_{16}$".

Rudder to Elevator and Rudder to Aileron Mixing
This mix is used to dial out unwanted pitch and roll caused by the rudder. The Edge has very little coupling, but dialing it out will make knife edge maneuvers easier. Use a preprogrammed mix if your radio has this feature, or if not, use a P-mix feature. Assign rudder as the master channel and elevator as the slave. Set the mixing values so when the rudder is deflected all the way in either direction on high rate, the elevator moves up $^{1}/_{8}$". In another P-mix, assign rudder as the master and aileron as the slave. Deflect the rudder to full left on high rate and set the mix value so that the ailerons deflect to the right $^{1}/_{16}$". Then deflect the rudder to full right and set the mix value so the ailerons deflect left $^{1}/_{16}$". You may have to tweak your values a few percent

to get it perfect. When its right, the Edge should fly straight when on knife edge and not roll at all or track to the top or bottom of the fuselage.

Spoileron Mixing
This can be achieved by using either a preprogrammed elevator to flap mix or a P-mix. Assign elevator as the master channel and flap as the slave. Set the mix values so that when full up, 3-D elevator is given, both ailerons also go up $^{3}/_{16}$''. This mix helps stabilize the model in some 3-D maneuvers such as the Elevator and Harrier.

Throttle Curve
This is normally a preprogrammed function. It can also be achieved in radios that do not have this premix but do have curve type P-mixing, by mixing throttle as the master and slave channels. Then adjust the curve to get the desired throttle servo response. This is particularly useful to get an engine to "act" linear through out the entire throttle stick movement. I also use this at times to make the throttle response less sensitive in the rpm ranges used for hovering the model. This makes altitude control easier and smoother when doing Torque Rolls.

Rates and Expos: when and where to use them

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

We use low rate settings for all flying except for 3-D 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. We use 3-D rate when doing stall turns and rolling circles, since the more rudder the better for these. When doing 3-D aerobatics, we normally flip to 3-D rates just before the maneuver. As soon as the maneuver is done, we flip back down to low rate to avoid over-controling the model.

Let's Get Down To It

When flying aerobatics with a larger model, you will find that it will do everything just like a smaller model….only better and easier. There are just a few exceptions to how things are done.

Throttle management is a must. You have to throttle back to idle when the nose is pointed down.

Snap Rolls
Just like the need to be throttle managed like a full-scale airplane, larger aerobatic airplanes need to be snapped like a full scale. Don't feel bad if this seems like a big "What are you talking about?" to you. It took me quite a while to figure this out. Let's back up to how we all learned to do a snap roll. If it's an inside (positive) snap, we pull the sticks into the corner, i.e. full up, full aileron, and full rudder in the same direction as aileron. When we want to stop snapping, we release the controls. For smaller models, this technique not only works but is normally the only way to get the model to snap. In a full-scale aerobatic plane, as well as with large models, snaps are different, particularly on the new breed of aerobatic birds like the Edge 540, which have large control surfaces.

Unloading Snaps
That's the whole trick. To start a snap roll, the same method as with a smaller model is used. Pull full up, full rudder, and aileron in the same direction. But soon as the sticks reach the corners, reduce or neutralize the elevator while keeping the rudder and ailerons at full deflecion. When you do this correctly, the Edge will not get "deep" into snaps. This allows it to keep more airspeed as it exits the snap, so it stops snapping where you what it to and flies out with more air speed. You'll also find that it will be a lot easier to exit a snap heading the same direction you were when you entered the snap. It'll take a little practice to get the hang of "flying" the snaps, but I'll bet you'll see a big improvement in the quality of your flying.

by Mike McConville

CONTINUED

Edge 540 3-D Excellence

3-D maneuvers (in simplest terms) are maneuvers performed by an airplane that are not usually done in a normal airplane flight path. What can be done with a 3-D capable plane is to make it fly like no other. For example, hovering in the air nose high at a 45-degree descent, floating along in level flight, hanging on the prop, or tumble tail-over-nose in a rapid flipping motion. When you sprinkle these maneuvers together with other loops, rolls, snaps, and spins, it seems like the aerobatic options are endless.

To fly 3-D, you must have a plane that's capable. What's capable? Well, it starts with having outlandish pitch control from having huge elevators. The same applies, but not to the same extent, with rudder and ailerons. When it comes to 3-D aerobatics, our Edge 540 is *second to none*.

The Maneuvers

Let's cover the seven 3-D maneuvers where the Edge really excels.

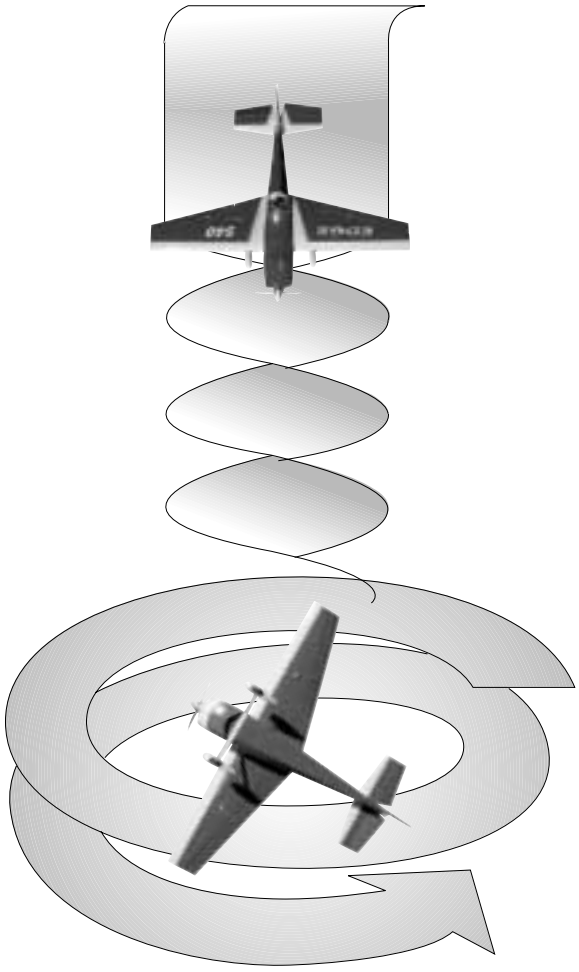
The Blender

What it is: The Blender or Panic maneuver is a vertical diving roll that virtually stops its descent as it instantaneously enters into a flat spin. The Edge is probably the best I've ever seen at this one.

Setup: Follow the 3-D setup as described in the manual. Be sure to use Expo. Setting the CG toward the aft location will help, but I have had great results even at the forward CG location. This is a wing tester and can be extremely violent but will always generate gasps of excitement. But done correctly, the Edge can handle the challenge.

How to do it: Start from about 400-500 feet straight and level, chop throttle, and push the nose straight down. As soon as the model is diving straight down at low throttle, add full left aileron. Let the model compete two or three rolls and then quickly transition the sticks to an inverted snap roll position (left aileron, right rudder, down elevator) all at the same time. As soon as the Edge enters a spin, quickly neutralize the ailerons while holding full right rudder and down elevator. If you do it right, the airplane will instantly transition from a left roll to a flat spin in the same direction, and the decent will all but stop.

The Blender



Tip: Add full throttle just after the spin goes flat. That'll keep fuel going to the engine, make the rotation speed high, and help stop the vertical decent.

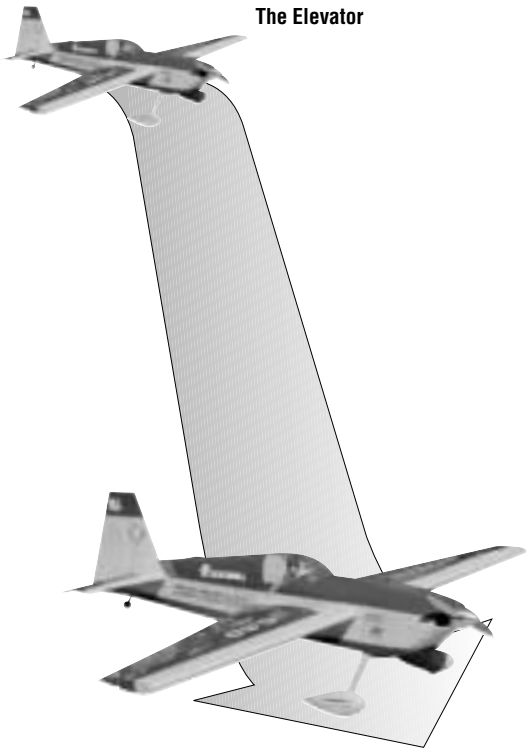
Recovery: Simply release rudder and hold just a little down elevator. The model will stop rotating and begin to fly out. As it gains airspeed, roll back to upright. Since you're in 3-D mode, make sure you don't do anything abrupt, or you'll stall again.

Setup and Flying

by Mike McConville

CONTINUED

The Elevator



The Elevator

What it is: The plane drops vertically while in a nose high attitude. Depending on the head wind conditions, the model will drop anywhere from about a 45-degree angle in calm conditions to vertical or even a little backwards in more windy conditions. Throttle is used to determine rate of descent and the nose high attitude of the model.

Setup: Same as the Blender, only for this one, flip the switch to turn on the spoilerons. This will help to keep the Edge from teetering back and forth.

How it's done: At near stall airspeed up high, slowly feed in up elevator until you have the full 3-D rate up in it. With low throttle, the Edge will fall like a rock. To guide it around, use the rudder, not ailerons. Just keep the wings level. Add power to change the attitude of your Edge.

Trickiest part: Aside from steering it with the rudder, you'll quickly see that this maneuver is a matter of juggling the throttle and rudder to get the plane to go where you want it to go.

Recovery: Basic recovering—add full power, flip to normal rate elevator, and fly out.

Advanced recovery: Take the elevator all the way to the ground—adding some power before it touches down to slow the decent and transition into a Harrier and land.

OR

Add power to get the nose to rise to vertical and transition into a Torque Roll. Elevator down from a hundred feet down to 20 feet (or less) and power up into a Torque Roll. Ooh!!

Worst way to mess up: Let your direction control (rudder) get away from you after starting too low—you could snap it right into the ground. Ouch!

The Harrier

What is it: It is very slow forward flight in a very nose high (about 45 degrees) attitude.

Setup: Same as the Elevator, and the raised ailerons help in this maneuver even more.

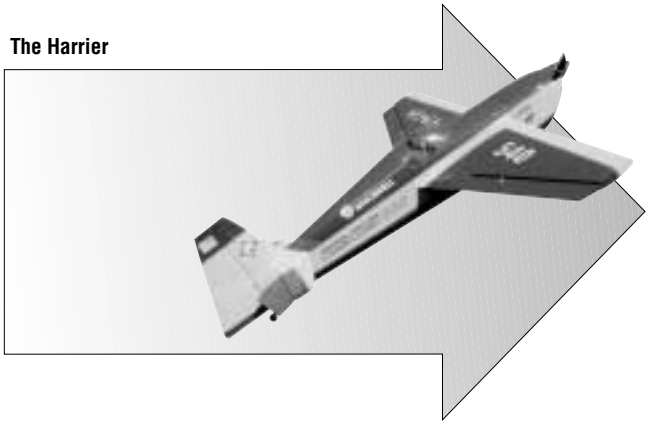
How it's done: Start by entering an Elevator maneuver. Let the Edge drop a small amount, then slowly add power until the vertical decent stops and the model begins to fly forward with the nose very high, all the while your holding full up elevator (on 3-D rate). Juggle the power to control the attitude and forward speed of the model. In a head wind, you may also have to juggle the elevator some to keep the model from pitching up to a vertical attitude. Use the rudder to steer the model around in the Harrier attitude. Try to use the ailerons very little, as they will cause the model to wobble side to side.

Trickiest Part: Keeping up with the model if it begins to wobble.

Recovery: Simply add full power and reduce elevator to transition into normal forward flight.

Advanced Recovery: After you get the hang of flying around in the Harrier, juggle the throttle to slowly lose altitude and do a Harrier landing. The model will land on the rear of the rudder first, then add a little power so it doesn't smack the landing gear too hard.

The Harrier

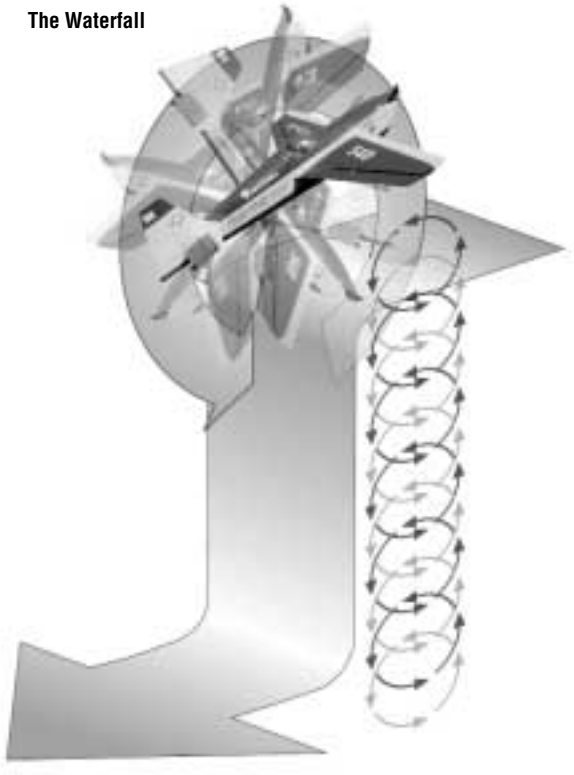


Setup and Flying

by Mike McConville

CONTINUED

The Waterfall



The Waterfall

What it is: This maneuver is a continuous tail-over-nose descending flip. It is not a loop, but the aircraft actually flops around its canopy.

Setup: Again, the critical component is having the 3-D elevator. The aft CG helps this the most.

How it's done: Start relatively high. At low throttle, gradually pull the nose up until its near vertical. Just before it stalls, add full down and, at the same time, add full power. You have to continuously "fly" the rudder and ailerons to keep the model flipping over in a straight line. To do consecutive Waterfalls, continue to hold full down and to "fly" rudder and ailerons and chop the throttle as the nose comes back up to vertical, then add full power as it flips straight down.

Trickiest part: No doubt here—flying the rudder and aileron correctly. You have to fly the rudder and ailerons and make constant corrections. The amount you add will vary. If you do not do this, the model will fall off into a knife edge spin.

Recovery: Just neutralize the elevator and the Edge will quit flipping, but expect some over-rotation, so practice high until you get the feel of it. Fly out straight and level or stop the rotation while pointed vertical and go into a Torque Roll.

Worst way to mess up: Take it down too low, over-control your elevator on recovery, and snap into the ground. To avoid this, simply change rates on your elevator to normal travel.

The Torque Roll

What it is: The Edge "hovers" vertically in place, rotating left around its roll axis. The "in-line" midwing configuration of the Edge makes it one of the easiest Torque rollers around.

Setup: Full 3-D throws in elevator and rudder are a must. An aft CG helps a little. Also gyros provide the best aid to stabilize the aircraft. They won't do the maneuver for you but they'll help. I found them a fantastic tool in learning to torque roll, kinda like training wheels. A few years ago gyros made a big difference for me; now I don't use them anymore. You'll need a power plant that will give you unlimited vertical before you try this one.

How it's done: Fly low along the ground at low throttle and gently add power with up elevator to bring the model into a vertical position. Add throttle to keep the nose pointed up and make corrections with rudder and elevator to keep things straight. If the model hovers but won't start rolling left, quickly blip the throttle up and down. The torque change will usually get it going.

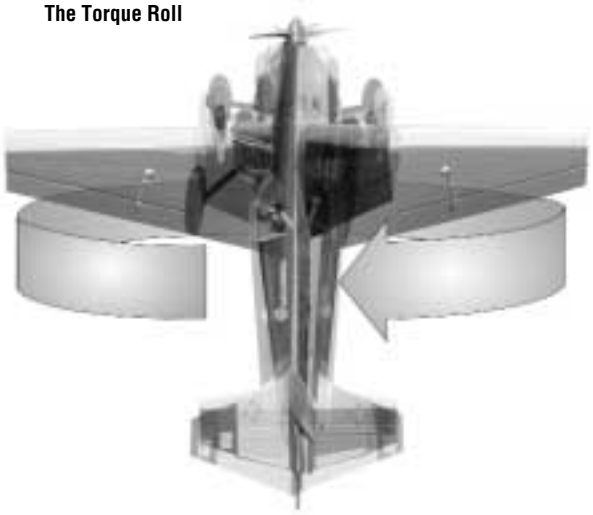
Trickiest part: Recognizing your correction when the model's belly is toward you.

Tip: Think push the rudder toward the low wing when the belly is toward you. You have to be fast with throttle corrections. Add bursts of power, along with rudder/elevator corrections. If you simply hold full throttle, you'll climb out of the maneuver.

Recovery: Fly out at full throttle.

Worst way to mess up: Have an unreliable engine. Torque Rolls are tough on engines because there's only prop-induced airflow over the cylinders. I'd really recommend putting the baffling in the cowl if you are running a twin-cylinder engine and plan on doing Torque Rolls.

The Torque Roll



Setup and Flying

by Mike McConville

CONTINUED

The Parachute

What it is: The Parachute or Terminator is a vertical dive that instantly decelerates in its descent as it instantaneously corners into an Elevator.

Setup: Same as the Elevator, and the raised ailerons help in this maneuver too.

How to do it: Start from about 400-500 feet straight and level, chop throttle, and push the nose straight down. As soon as the model is diving straight down at low throttle, add full up elevator. If you do it right, the Edge will instantly transition from a vertical dive to an Elevator.

Tip: Add a little throttle just after transition to an Elevator. That'll keep fuel going to the engine and keep it from quitting.

Recovery: Simply add full power and reduce elevator to transition into normal forward flight.

Advanced Recovery: Juggle the throttle to slowly lose altitude and do a Harrier landing. The model will land on the rear of the rudder first, then add a little power so it doesn't smack the landing gear too hard.

Worst way to mess up: To build up too much speed. This maneuver has huge "WOW" factor, but just like a Blender, too much speed and it over stresses the wing. Watch the speed.

The Parachute

The Wall

What it is: The Wall is a Parachute turned on end. The model starts in normal level flight and suddenly corners nose up 90 degrees, as if it hit a wall.

Setup: Same as the Elevator, and the raised ailerons help in this maneuver too.

How to do it: Start from about 100 feet straight and level, chop throttle, and as the model begins to slow down, quickly pull full up elevator. When the Edge corners to vertical, add full power and release the up elevator.

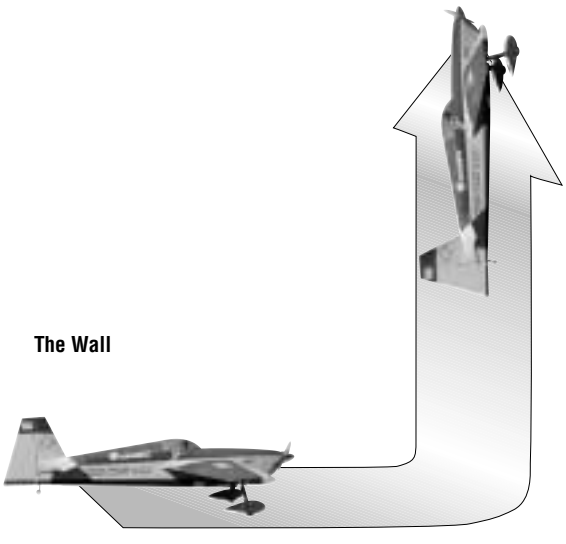
Tip: Start at low speed and add power at the same time that you begin to pull full up elevator.

Recovery: Simply release the elevator, go to full throttle, and fly out upward.

Advanced Recovery: Juggle the throttle to sustain a hover and transition into a Torque Roll.

Worst way to mess up: Don't get the throttle in quickly enough and the model falls backward.

Great combo: This has become one of my favorites. Takeoff normally, but as soon as the Edge is airborne, chop the throttle and do the Wall, then transition into a Torque Roll over the runway. Practice all of this stuff up high before you try that.



The Wall

I hope you enjoy your Edge as much as I do!

Happy Landings!

Mike McConville

Preflight at the 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. Turn on the radio in your airplane. With your airplane on the ground, you should be able to walk 30 paces away from your airplane and still have complete control of all functions. If not, don't attempt to fly! Have your radio equipment checked out by the manufacturer.

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

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

Step 4. Check all control linkages to make sure they are securely fastened.

Adjusting the Engine

Step 1. Completely read the instructions included with your engine and follow the recommended break-in procedure.

Step 2. At the field, adjust the engine to a slightly rich setting at full throttle and adjust the idle and slow speed needle so that a consistent idle is achieved. Before you fly be sure that your engine reliably idles, transitions and runs at all throttle settings. Only when this is achieved should any plane be considered ready for flight.

Step 3. Before each flight, check the tightness of al the engine mounting bolts.

AMA Safety Code

Offical AMA National Model Aircraft Safety Code
Effective January 1, 1999
Model flying MUST be in accordance with this Code in order for AMA Liability Protection to Apply

General

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

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.

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

At all flying sites a straight or curved line(s) must be established, in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed in front of the flight line. 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 mode is 55 pounds.

At air shows or model flying demonstrations, a single straight line must be established, one side of which is for flying and 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 side conditions and model size, weight, speed, and power, must be jointly approved by the AMA President and the Executive Director.

Under all circumstances, if my model weights over 20 pounds, I will fly it in accordance with paragraph 5 of this section of the AMA Safety Code.

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.

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.

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. (A model aircraft is defined as an aircraft with or without an engine not able to carry a human being.)

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. (This does not apply to ducted fan models using piston engines or electric motors.)

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

AMA Safety Code

CONTINUED

Radio Control

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

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

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 by control.

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.)

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.

I will not fly my model aircraft in any racing competition, which allows models over 20 pounds unless that competition event is AMA sanctioned. (For the purpose of this paragraph, competition is defined as any situation where a winner is determined.)

Every organization racing event requires that all officials, callers, and contestants must properly wear helmets, which are OSHA, DOT, ANSL, SNELL, NOCSAE or comparable standard while on the racecourse. In addition, all officials occupying safety cages must wear protective eye-wear.

Template

Cut-Out of Cowl Bottom MDS 1.48