

MATRIX 40

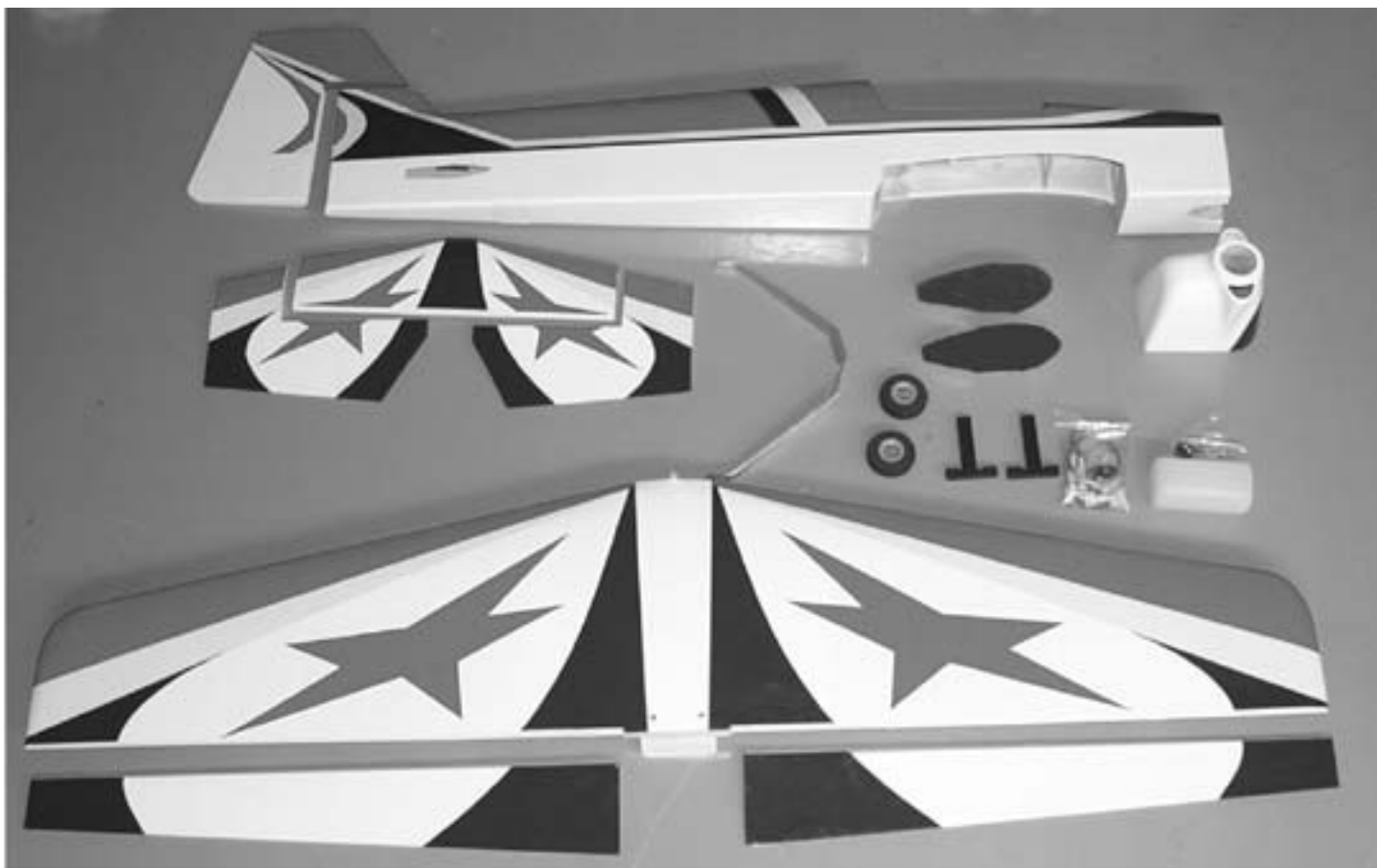
EXTREME 3-D ARF



Congratulations on your purchase of the **Matrix 40 Extreme 3-D ARF**. This is a very unique dual-purpose aircraft, capable of flying any FAI pattern sequence with ease, while exhibiting remarkable 3-D capabilities. Every effort has been made to produce a lightweight, straight, easy to assemble aircraft. Because of its oversize control surfaces which are double beveled to allow for extreme throws, great care must be taken in the set-up and flying of this airplane. Quality hardware components have been provided to allow for 3D set-up while maintaining adequate mechanical advantage to eliminate flutter. It is your responsibility as an advanced pilot to fly the aircraft in an intelligent manner. **THROTTLE MANAGEMENT IS A MUST!!!!!!** Carl Goldberg Products has flown the **Matrix 40** through a very rigorous flight-testing schedule and have stressed the airframe beyond all practical parameters without a single failure. Carl Goldberg Products will NOT warrant the **Matrix 40** against flutter due to improper set-up or excessive speed maneuvers. Having said that, we believe you will find the **Matrix 40** to be one of the most responsive, in-the-grove aircraft on the market. The **Matrix 40** excels at high-alpha maneuvers including Harriers (both upright and inverted), high-alpha rolls, and high-alpha knife edge. Torque rolls, waterfalls, knife edge loops and elevators are all within the performance parameters of this unique aircraft. Just remember to use common sense when flying this high performance machine.

CARL GOLDBERG PRODUCTS, LTD.

P.O. Box 88 Oakwood GA 30566 Phone #678-450-0085 Fax # 770-53-63 www.carlgoldbergproducts.com



We are very proud of the construction of the **Matrix 40** and all of our other ARF aircraft. Each aircraft is jig built to insure a straight true airframe. Every effort is made to build as light an aircraft as possible. As with any professional builder, glue is used sparingly. **Please take a moment during assembly and run a bead of CA or aliphatic resin into the high stress joints that you can reach such as the landing gear plate, servo mounting trays, wing hold down blocks, etc.** Also, during the course of shipping from the manufacturer to our facility in the United States, it is not uncommon for the aircraft to experience several changes in climate. This may cause the iron-on covering to develop wrinkles. This is not a fault of the manufacturer. Please take a few minutes with your heating iron and heat gun to iron down the seams and re-shrink the covering where needed. The results will be a beautiful aircraft with a breathtaking finish that you will be proud to display at your flying club.

Important Information

Covering coming loose is not COVERED UNDER WARRANTY. Due to temperature changes the plane may develop some wrinkles in the covering that you will need to remove with an iron. Be sure to seal the edges down first so that you do not cause the covering to shrink and leave exposed areas of wood. Please inspect the plane before beginning to assemble to make sure you are happy with it. After assembly has begun you cannot return the kit. If you find a problem before beginning to assemble the plane you must contact us, please do not return it to the dealer.

Parts List

1. Fuselage
2. Fiberglass Cowl
3. One piece wing /ailerons
4. Stab/elevator assembly
5. Rudder
6. Fiberglass wheel pants
7. Canopy
8. Fiberglass landing gear cover

Hardware List

Motor Hardware

1. (2) Motor Mounts
2. (4) 4mm x25mm bolts
3. (4) 4mm blind nuts
4. (4) 4mm lock washers
5. (4) 4mm flat washers

Landing Gear

1. Main Gear 1 left 1 right
2. (4) 3mm x12mm bolts
3. (4) 3mm flat washers
4. (4) 3mm blind nuts installed in fuselage
5. (2) 2-1/4" main wheels
6. (2) 4mm x40mm bolts (axles)
7. (2) 4mm nuts
8. (2) 4mm flat washers
9. (2) 4mm wheel collars

Tail wheel

1. (1) Tail wheel bracket
2. (1) 7/8" tail wheel
3. (2) 2mm x10mm screws
4. (2) 2mm wheel collars

Wing

1. (2) 5mm x40mm wing bolts
2. (2) 5mm washers

COWL HARDWARE

1. (4) 2mm x10mm screws for cowl mounting

Control System

1. (5) Nylon control horns
2. (5) Nylon control horn plates
3. (8) 2-56 x 3/4" Bolts
5. (7) Nylon clevis
6. (7) Silicone clevis keepers
7. (3) Nylon swing in keepers
8. (2) E-Z connectors
9. (1) 1.25mm x50cm Throttle rod
10. (1) 3.25mm x41.5cm nylon tube
11. (1) 2-56 x 10" Rudder push rod threaded
12. (2) 2-56 x 10" Elevator pushrods threaded
13. (2) 4-40 x 4" Double Threaded Rod Aileron pushrods.
14. (4) 4-40 Golden Clevis
15. (2) 4-40 Nut
16. (2) Clevis Keeper

Fuel Tank

1. (1) Fuel Tank
2. (1) Rubber stopper
3. (2) Metal caps for stopper
4. (1) Screw
5. (1) Clunk
6. (3) Aluminum fuel tubes
7. (1) Silicone fuel line

Elevator pull-pull hardware

1. (2) 2-56 x 29" Threaded Rod
2. (2) Nylon Clevis
3. (1) bellcrank assembly with hardware
4. (2) Nylon swing in keepers

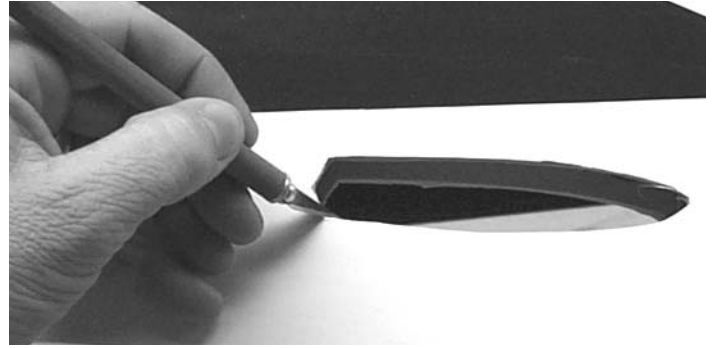
Before beginning assembly of your **Matrix 40**, we highly recommend that you study this manual in its entirety. You should begin planning your radio installation based on your choice of engine and equipment from the beginning, as space is limited within the fuselage of the **Matrix 40**.

Because the **Matrix 40** is intended for those with some degree of modeling experience, every minute detail will not be covered. This is not a basic trainer. Assembly of this aircraft will be easy for the experienced modeler, and by following the instructions within this manual and using the skills you've gained during your modeling career you will be able to produce a first class aircraft.

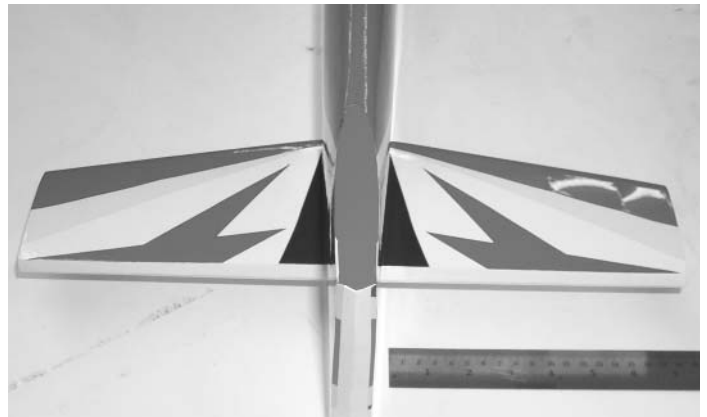
Building supplies needed

Hobby knife w/#11 blades
Thin CA
Medium CA
Canopy glue
30 minute epoxy
Thread lock
Diagonal wire cutters
Pliers
Assorted drill bits
Various sized screwdrivers(both Phillips and standard head)
Tape measure
Dry-erase marker
Paper towels
Rubbing alcohol

Mounting Stab



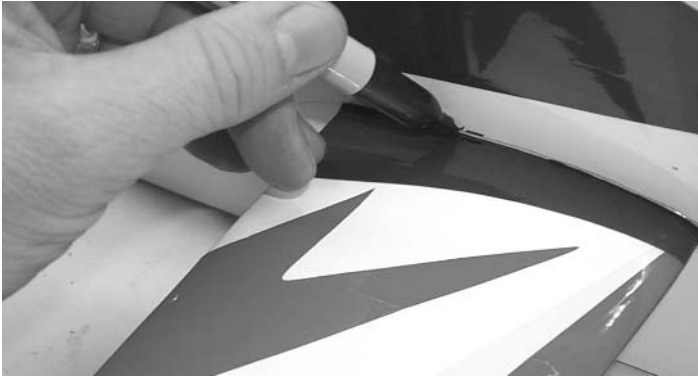
1. Begin construction by locating the fuselage, wing, wing bolts, washers, and the horizontal stab. Using a #11 blade, remove the covering from the stab location at the rear of the fuselage.



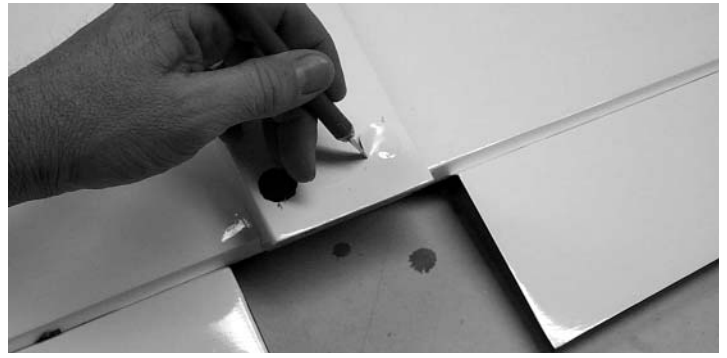
2. Insert the stab into the slot and center using a tape measure or ruler to measure from the fuselage side to the tip of the stab.



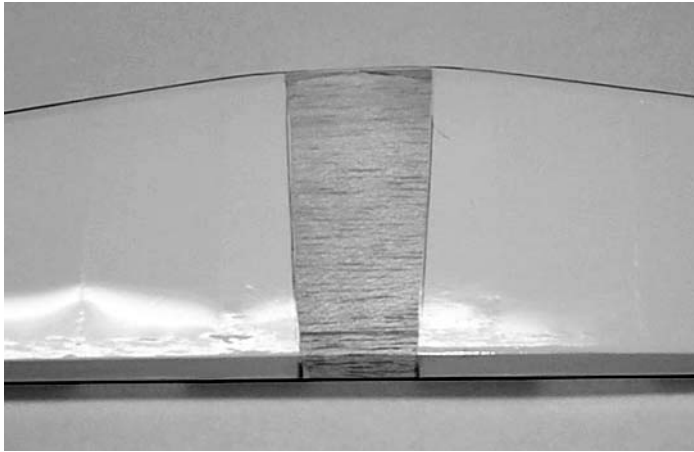
3. With the stab centered, measure from one tip to the back of the wing cut out. Move stab until this figure is the same on both sides.



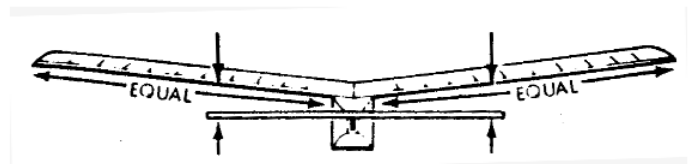
4. When satisfied with the alignment, use a dry-erase marker to draw a line on side of the stab, top and bottom where it meets the fuselage. Remove stab from opening.



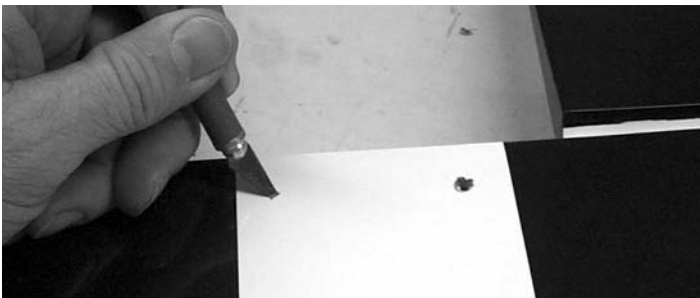
7. Turn the wing over and remove the covering over the wing bolt holes. Slide the front wing dowels in to the holes in the fuselage saddle. Push down on the rear of the wing till it sits in the fuselage. Using two wing bolts and washers, screw the wing down to the fuselage.



5. Using the #11 blade, remove the covering on the top and bottom of the stab between the lines. Cut about 1/8" inside the lines so that there is no exposed wood when glued in place. Be careful to cut only the covering and not into the wood of the stab as this would weaken the stab.

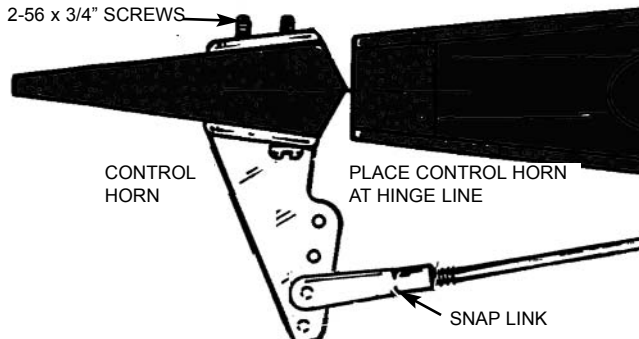
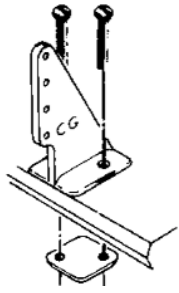


8. Insert the stab into the fuselage one more time before gluing and check alignment with wing. Wing and stab should be parallel. When satisfied with alignment, remove stab. Mix some 30- minute epoxy and apply to stab opening in fuselage and to bare balsa on the stab. Re-insert stab into fuselage and check alignment using all previous methods. Wipe away any excess epoxy using rubbing alcohol and a paper towel. Use masking tape to maintain alignment while glue dries.

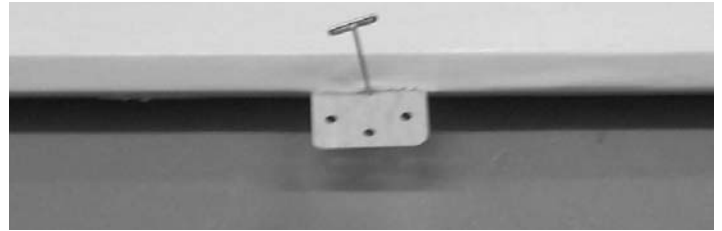


6. Using the #11 blade, remove the covering over the rear wing bolt holes on the top of the wing.

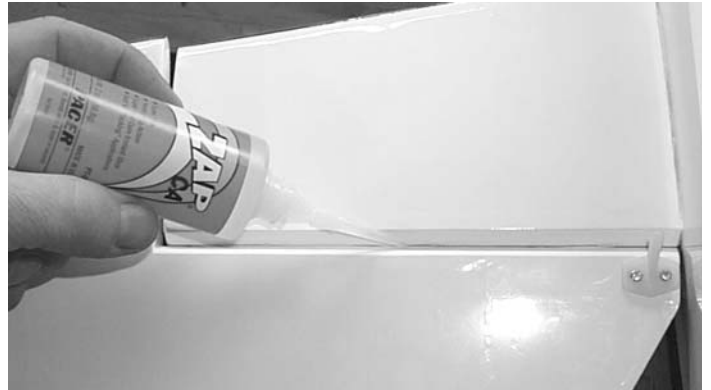
Control Horns



1. While the epoxy dries on the stab, mount the control horns on the elevators. Align on the inside edge of elevator on the bottom side, with the holes on the horn aligned over the hinge line. Use a square to check alignment of holes over hinge line, this is important to maintain even throw on both elevators. Use a long drill, piece of wire, or pencil to mark the holes through the control horn. Remove the horn and drill the holes using a 5/64" drill. Mount the horns to the elevators using the 2-56 x 3/4" bolts and the nylon plates on top of the elevator.



2. Install the e-z hinges in the stab using a pin in the center of each to make sure they stay aligned.



3. Install the elevators on the hinges and with the elevators pushed tightly against the stab, remove the pins. Using thin CA, glue each hinge in place by applying two to three drops on each hinge. Have the elevators deflected to full up when gluing the bottom side of the hinges and deflected to full down when gluing the top side of the hinges. This will insure that you can get full throw later.

TAIL WHEEL BRACKET



1. Locate the tail wheel bracket, mounting screws, wheel and wheel collar.



3. Place tailwheel on the bottom of the fuselage so that the wire is flush with the back of the fuselage and centered on the bottom.

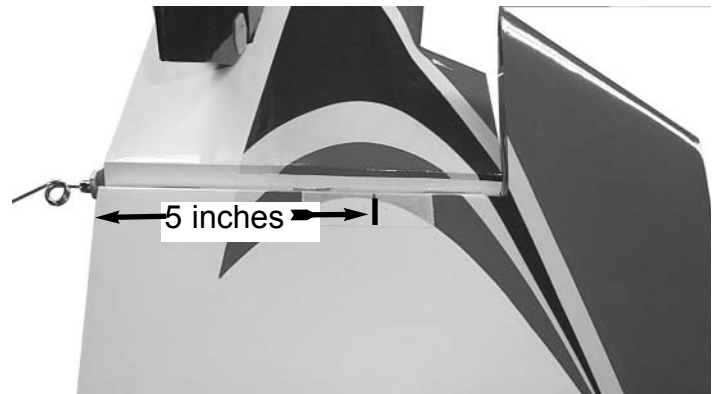
Drill two 1/16" holes in the location of the two mounting holes and install the tail wheel using the 2mm screws.



4. Mark the location of the tail wheel wire on the rudder and drill a 5/64" hole into the rudder to accept the tail wheel wire.

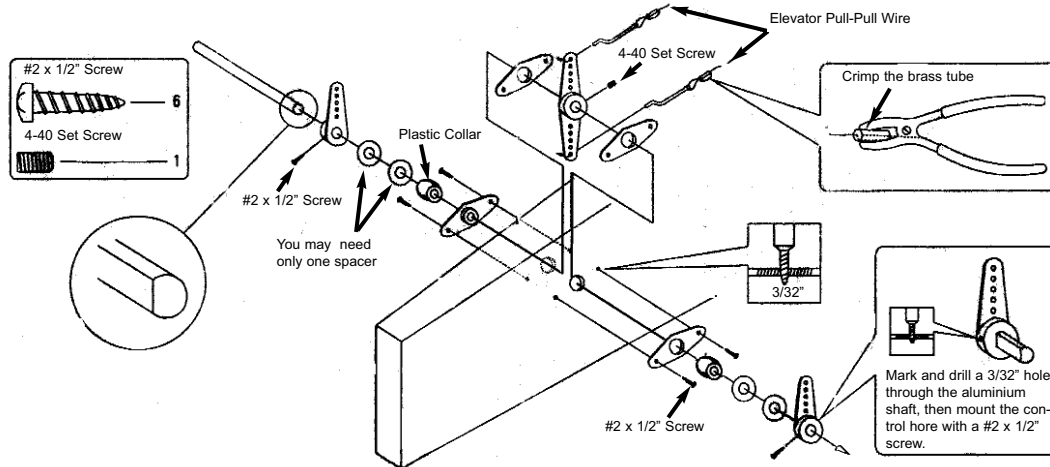


5. using pins to center the hinges as was done with the elevators, install the rudder. Deflect to full throw and glue the hinges in place using thin CA.



6. Locate the rudder horn 5" from the bottom edge of the rudder on the left side. Mark the holes and drill using 5/64" drill as was done with the elevator. Mount the horn using the 2-56 x 1" bolts and nylon plate. Twist the control horn so that it is facing the rudder servo hole.

Elevator Bellcrank



1. Locate the elevator bellcrank hardware.



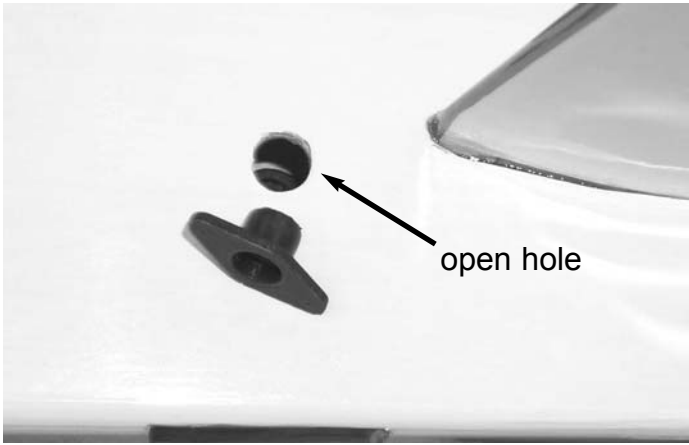
2. The aluminum shaft has a hole on one end, make sure that the hole size is 3/32" by using a drill in the hole. Install one of the control arms on the end with the hole using a 2mm screw. The screw should go all the way through the arm.

3. Locate the center tiller arm and the two 2-56 x 29" threaded rod with two nylon clevis.

Install the tiller set screw into the tiller arm.

Thread the nylon clevis onto each of the rods then snap the clevises to the center tiller arm.

Push the center tiller arm through the fuselage towards the tail starting at the radio compartment.



4. Using your #11 blade, open the hole on both sides of the fuselage. Install the mounts in both sides using the 2mm screws supplied. There is an access hole in the bottom of the fuselage for installing the plate on the inside.

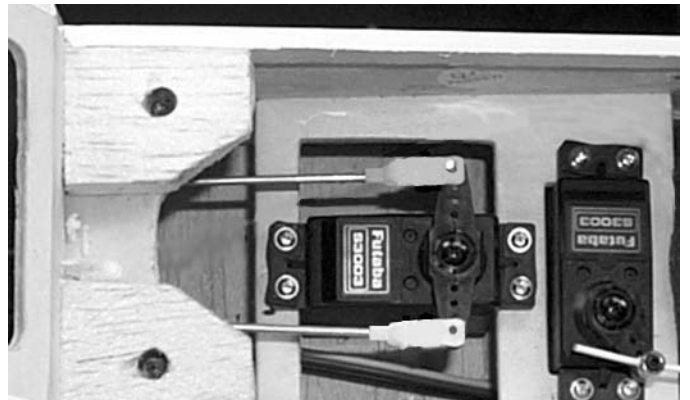
Note: You may need to make the hole slightly larger. Use a dowel with sand paper to help open the hole. Do not open the hole more than required.



5. Install the shaft through the mounts by first putting a washer, then the ball shaped bearing, and inserting in one side. You must then install the tiller arm on the shaft as it passes through the fuselage. On the other side install the ball shaped bearing, another washer and then the other control arm. You must now mark the location of the hole on the aluminum shaft and drill a 3/32" hole to accept the 2mm screw. Install the screw through the shaft and into. Rotate the shaft so as both control arms point to the bottom of the fuse. Through the access hole on the bottom of the fuse. Center the tiller arm in the fuselage and tighten the set screw. (See Drawing on top of page 8)



6. you can mount the hatch cover on the bottom of the fuselage using clear tape or screws (not included)



7. Center the elevator servo in the tray and mount the servo using the hardware supplied with the radio.

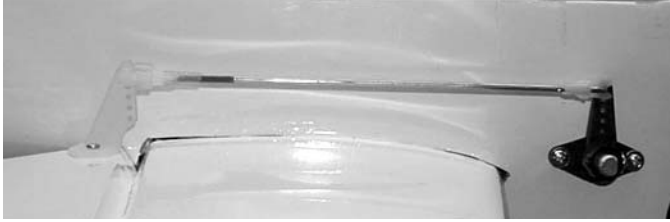
Place the elevator pushrods on top of the servo arm.

8. Making sure that the elevators are level, mark the outer hole location on the pushrods and make a 90 degree bend.

9. Insert the pushrods through the bottom of the servo arm and install the nylon swing in keepers.

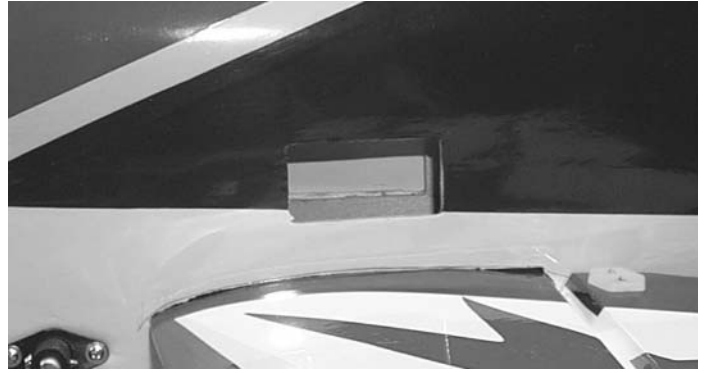
Cut off the remainder of the wire so 3/8" is showing.

11. Locate the two 2-56 x 10" elevator pushrods and thread a clevis on each. Install the clevis on the elevator horn and mark the location of the bend at the bellcrank. Bend the rod 90 degrees and cut to a length of 3/8".



12. Install the elevator pushrod using the two short nylon swing in keepers on the bellcrank end. (Don't forget to use the silicone retainers)

Rudder Servo



1. Remove the covering over the rudder servo cutout with your #11 blade. It is just above the elevator bell crank hole on the right side of the plane.



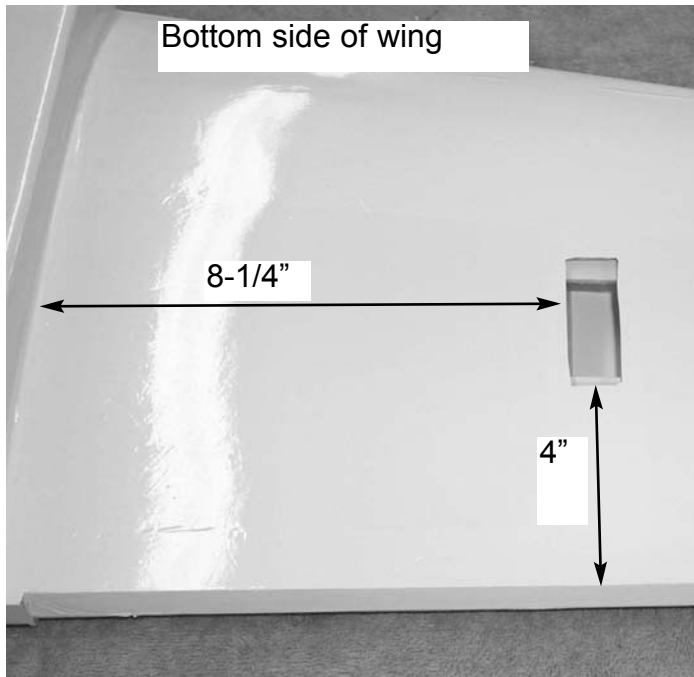
2. Install the rudder servo using the hardware supplied with the radio. You will need an 18" extension added to the servo lead.



3. Locate the 2-56 x 10" pushrod and thread a clevis on the end. (Don't forget the silicone keeper) Install a servo arm on the servo and center the servo. The servo arm should be positioned pointing up parallel to the rudder hinge line. Mark the location for the bend and make a 90 degree bend. Cut off at 3/8" and install in the servo arm using the swing in nylon keeper to retain it. The hole in the servo arm will need to be drilled to a 5/64".

Ailerons

1. Hinge the ailerons on to the wing using pins and Thin CA just like the elevators and rudder.



2. Locate the servo hole in the wing and remove the covering with a #11 blade.

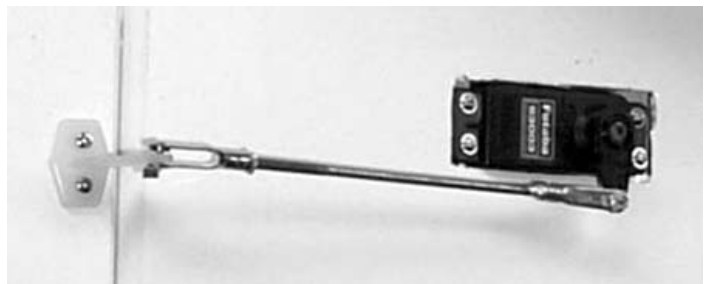


3. Install the servo using the hardware supplied with the radio. Inside the cutout you will find a piece of nylon fishing line to pull the aileron lead to the center of the wing. Tape your servo lead to the fish line and pull it out the hole in the center of the wing.



4. Install a control horn on the servo and center the servo with the arm parallel to the hinge line. Locate the position for the control horn by laying a 90 degree triangle down. Keeping the bottom of the triangle parallel to the hinge line and the top even with the outer servo arm hole.

5. Mark the location and drill two 5/64\" holes. Mount the horns using the 2-56 x 3/4\" screws



6. Screw a 4-40 nut and metal clevis on each end of the 4-40 pushrod. Adjust the length of the pushrod till the aileron is level.

Tighten the nuts against each clevis.

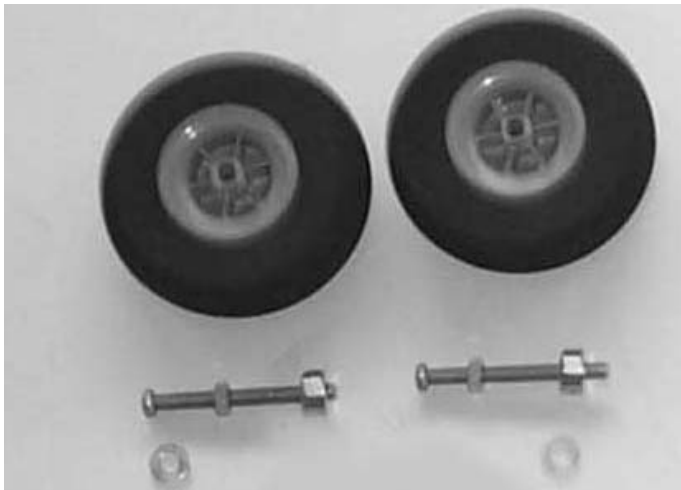
Place the clevis clip onto each of the 4-40 clevises.

Landing Gear and Wheel Pants



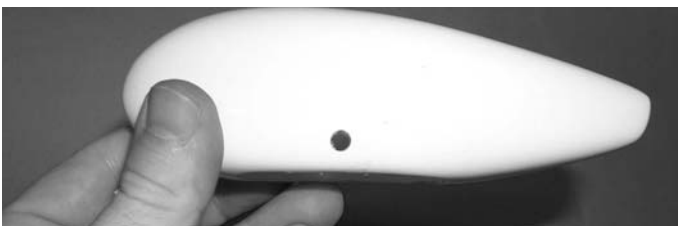
Note: The wheels provided are good for asphalt run ways but not for some grass fields. Use a 2-3/4" wheel for grass run ways. You might have to open the bottom of the wheel pants more.

1. Locate the landing gear and bolt in place using the four 3mm x12mm bolts and flat washers. **Use thread lock compound.** The blind nuts are already installed in the fuselage.



2. Locate

- 2- wheels
- 2- axles (4mm bolts)
- 2 4mm nuts
- 2 4mm washers
- 2 4mm wheel collars
- 2 Wheel pants
- 4 #6 washers

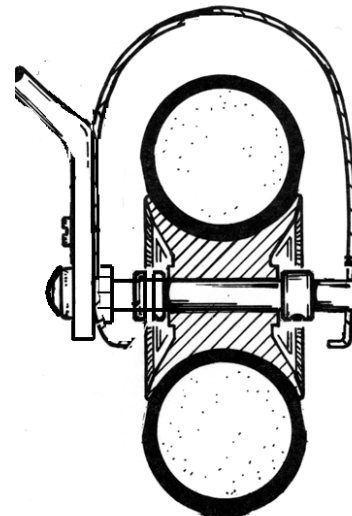


3. Locate the two fiberglass wheel pants. Look inside the wheel pant and identify the plywood pad. This pad is on the inside portion of the wheel pant and goes against the landing gear.

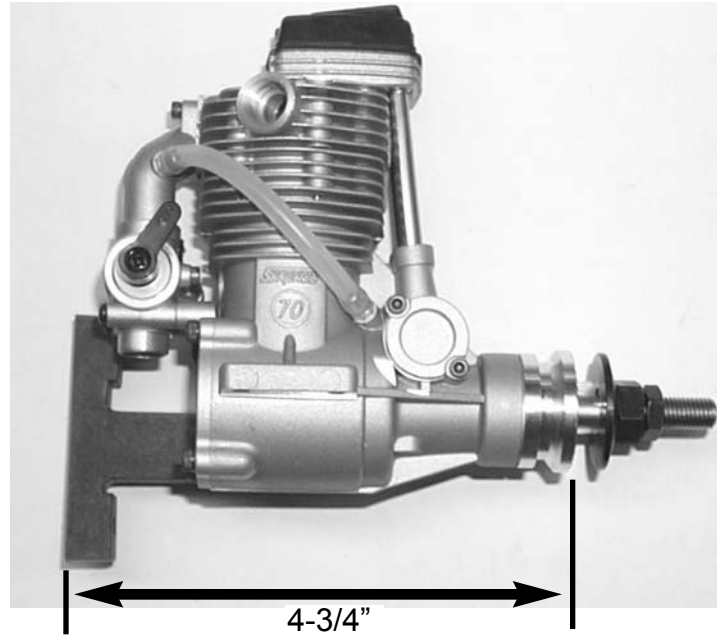
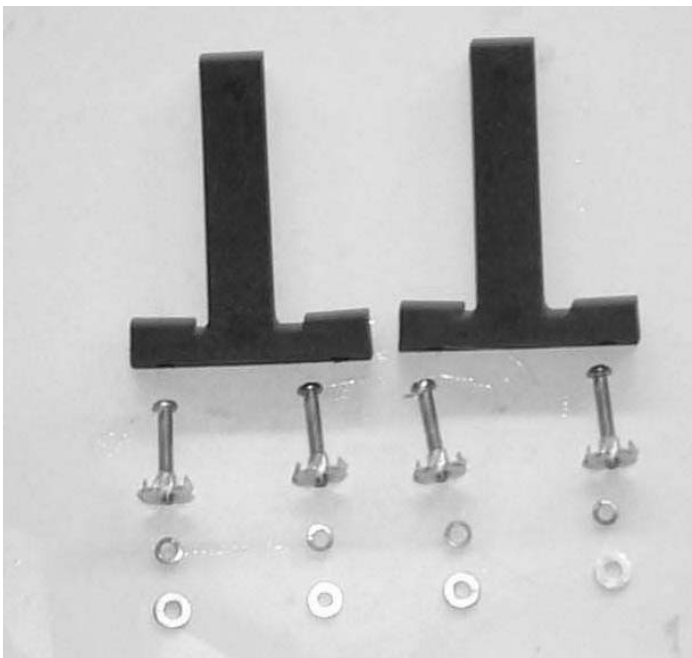
The pants are just alike except for this mounting pad. drill a 5/32" hole into this mounting pad, 1/4" up (or into the bottom of that pad) from the bottom edge and centered on the wheel opening.



4. Insert 4mm bolt through landing gear and hole in wheel pant. Place the washer over the bolt and start the nut on the end. You will now have to put the two #6 washers and the wheel into the wheel pant and let the bolt go into the wheel as you tighten the nut down. When the nut is tightened all the way down, it will clamp the wheel pant to the landing gear leg. You can rotate the wheel pant into the correct position and finish tightening the nut. A drop of thread lock works well here. You can then install the 4mm wheel collar on the end of the bolt to hold the wheel in place.



Engine Mounting



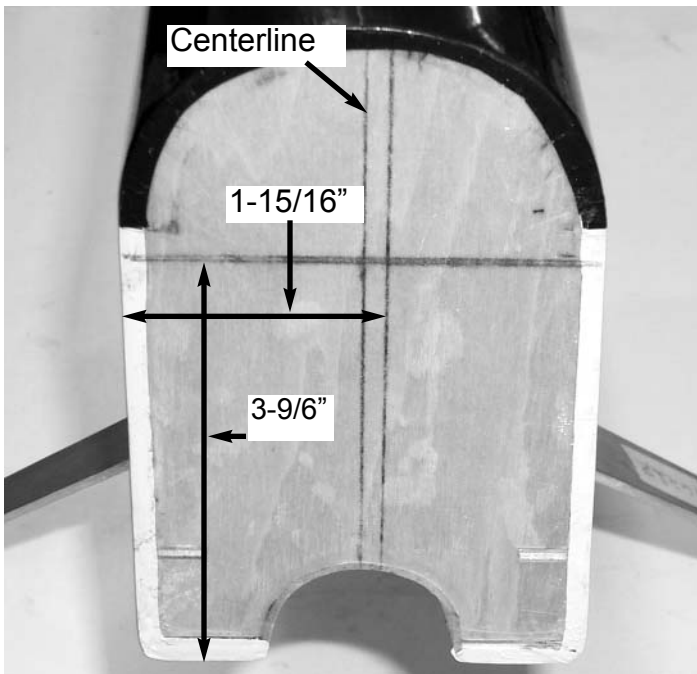
Note: The distance that is shown is for using a Carl Goldberg spinner. If you are going to use a different spinner, the front of the cowl needs to be 4-5/8" from the firewall.

1. Locate

- 2- motor mounts
- 4- 4mm x25mm bolts
- 4- flat washers
- 4- lock washers
- 4- blind nuts.
- 4- #6 x 3/4" Screws

3. Place you engine in the mounts and adjust till the prop washer is 4-3/4" from the firewall. Clamp the engine in place and and mark the location of the mounting holes. Drill using a 7/64" bit.

Screw the engine onto the motor mounts using the #6 x 3/4" screws.



2. Mark the firewall as shown above.



4. Keeping the engine perpendicular to the table top, clamp the other motor mount to the engine. Mark and drill the second motor mount then screw the mount to the engine.

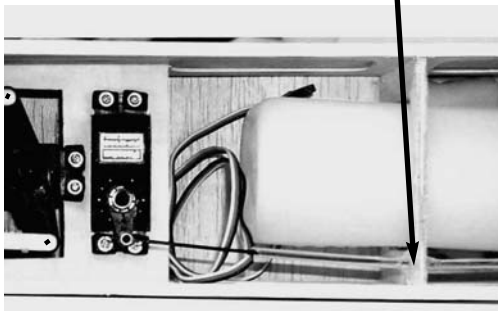


5. Align the motor on the firewall. Center the engine on the off center vertical line and the horizontal line. Drill holes on the marks using a 3/16" drill. Insert the blind nuts into the rear of the fire wall and tighten using washers and lock washer (use thread lock).



6. Drill a 9/64" hole in the firewall in position with the throttle arm. Insert the 3.25mm nylon sleeve in the hole. Install an e-z connector in the throttle arm and install the 1.25mm x50cm pushrod. drill your fuel line holes at this time.

Glue the nylon sleeve to bulkhead



7. Mount the throttle servo in the servo tray ahead of rudder servo. Position the servo so that the servo arm is on the same side as the throttle pushrod. This may vary depending on the engine used. Glue the nylon sleeve to the bulkhead to prevent flexing of the rod. Install another e-z connector on your servo arm and attach to the throttle pushrod.

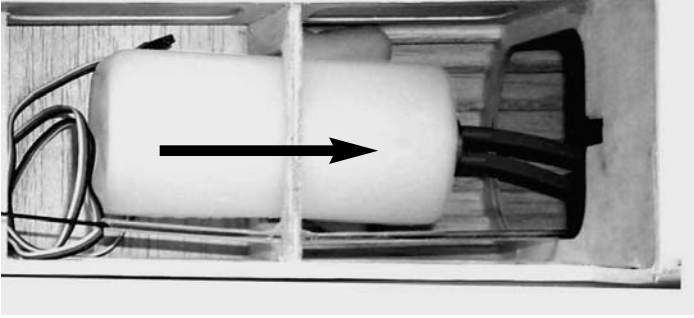
Fuel Tank



1. Locate the fuel tank and hardware.

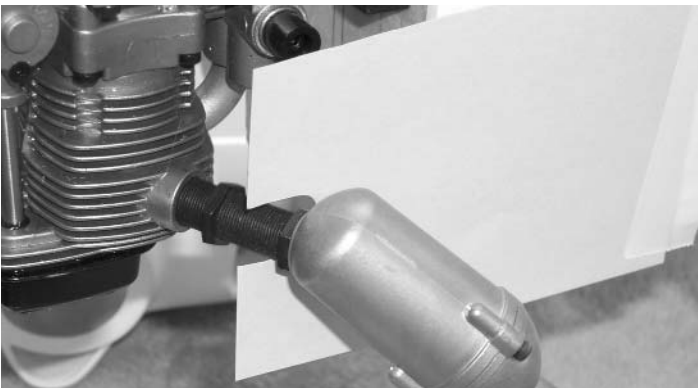


2. Assemble the cap by inserting the screw through the large washer, through the black rubber and threading into the small washer on the back side. Insert the three metal fuel lines into the holes in the cap. The short line will be the pickup line and will have the silicone tubing attached to the back end. On the other end of the silicone tube install the clunk. This should be adjusted in length so the clunk is about 1/4" off the bottom of the tank. One of the long tubes should be bent so it rest against the top of the tank. This is the vent line. The other tube will be the fill line. Insert the stopper in the tank and mark the fill, vent, and pickup line so you don't get them mixed up later. If you are using a YS engine which pressurizes the tank, you should wrap the tank in strapping tape with a couple of loops going around the cap to make sure it does not blow off.



3. Install the tank in the fuselage in the notches provided in the bulkhead, and hold in place with foam(not provided). Attach the fuel lines(not provided) to the three metal lines and route through the hole in the firewall and to your engine. If you are using an engine without a pump or pressure system you will probably have to mount the tank in the nose of the plane.

Cowl installation

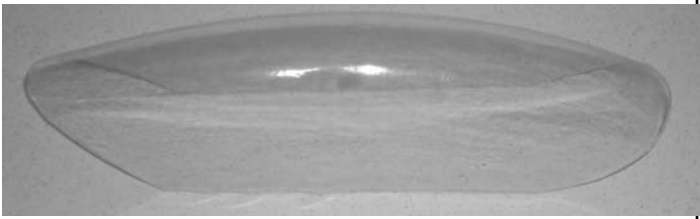


1. The easiest way to cut the opening for the muffler, needle valve, and head is to use a piece of cardboard and cut it to fit around the part you are fitting. Tape the cardboard to the fuselage about 1" behind where the cowl will end. You can now remove the muffler, slide the cowl in place and transfer the hole to the cowl from the paper template. You will need to start with the head because the cowl will not go on until the head clearance is cut. A Dremel tool with a cutter and a sanding drum does the best job.

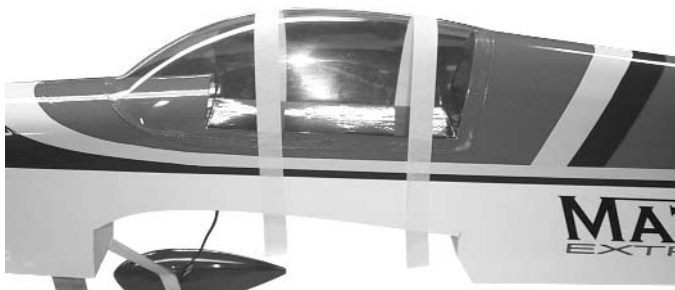


2. After all the cutouts are made in the cowl, you can use the same method to mount the cowl. Tape the paper templates to the fuse side and make a hole that will be in line with the firewall. This needs to be about 1/8" back from the front edge of the firewall so the screws will hit the solid wood of the firewall and not just the soft balsa of the sides. With the templates in place, install the cowl and put your spinner back plate in place. Place a 1/8" shim between the cowl and spinner backplate and tape in place. When satisfied with the alignment of the cowl, transfer the holes from the paper templates to the cowl. Remove the cowl and drill 5/64" holes at this location. Reinstall the cowl and tape back into position. Use a 1/16" drill to drill pilot holes for the screws through the holes in the cowl. Install with the 2mm screws provided. It is a good idea to remove the cowl and harden the mounting holes by dropping a couple of drops of thin CA into each hole. Let cure before reinstalling.

Canopy



1. Locate the canopy and trim to the scribe line. It is a good idea to trim about 1/8" outside the line at first and then trim to fit so as not to get it too small.



2. Position canopy and check fit. When happy with fit glue in place with ZAP canopy glue. Use masking tape to hold in place till glue dries.

Decal Location



1 Clean model surfaces thoroughly before applying decals.

2 Cut decal sheets apart in sections, as needed.

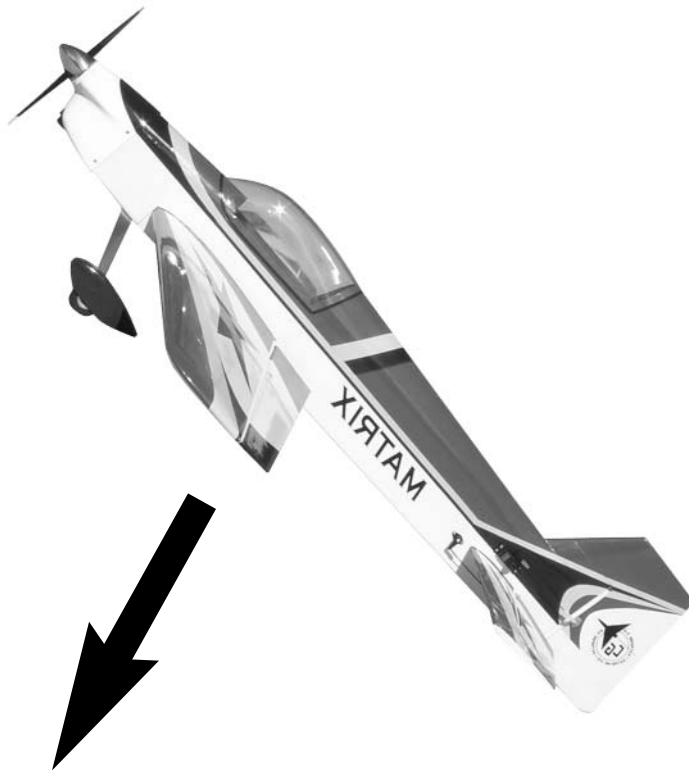
Fold decal in half, front to rear. Open at fold and lay decal out straight. The protective backing will bubble away from the decal at the fold. Using a scissors, cut the backing along the bubble, removing a strip of backing about 1" wide. Carefully position the decal on the model and stick in place. Then, working from the center, rub the decal down while peeling off the backing.

Balancing

Your model should balance at 5-1/2" to start. For extreme 3D you may want to move the CG back to 6-1/2" or more. Just remember that the further back you go the more sensitive it will become. With extreme throws the model can get beyond the ability of novice pilots very quickly.

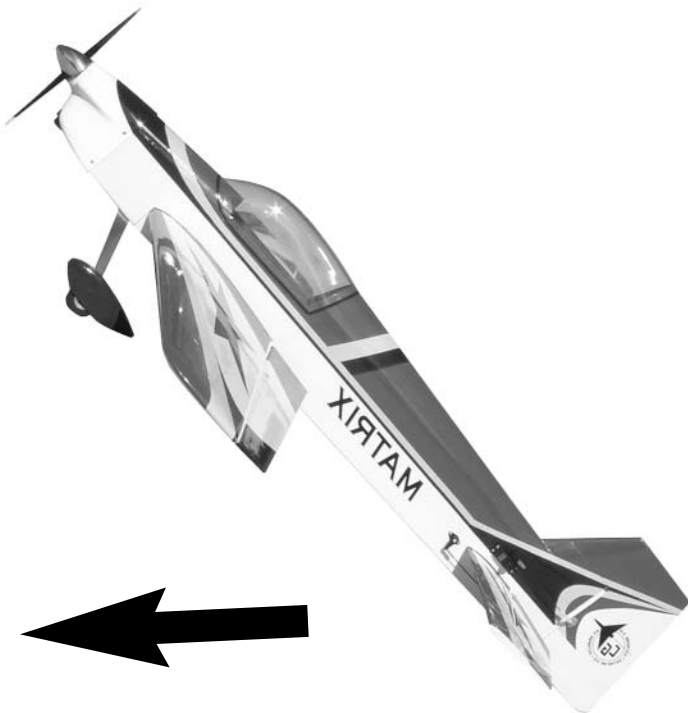
Start with the controls set at low rate with the ailerons plus or minus 3/8", the elevator plus or minus 1/2" and the rudder plus or minus 1-1/2". High rate should be all you can get.

Good Luck and I hope you enjoy flying the **Matrix 40 3D**.



The Elevator

This maneuver has your plane drop vertically in a nose high attitude, depending on wind conditions any where from a 45 degree angle in low wind to almost backwards in higher wind conditions. To perform it, at a high altitude with high rates on, pull your throttle back and feed in the elevator until you have the full high rate applied. Use the rudder to guide the plane, and adjust attitude with minor throttle inputs. You will loose altitude quickly, to recover, apply full power and fly out level. Watch out for getting too low or applying too much rudder, it could cause the plane to snap.



The Harrier

This maneuver has your plane in very slow forward flight in a nose high 45 degree attitude. To perform it, enter the same way as you would an elevator, then feed in power until the plane maintains altitude and starts to fly forward at a nose high attitude. Maintain it by holding up elevator and adjusting power, use the rudder to change direction. Using ailerons may cause the plane to snap and should be avoided. Add power and push the nose back over to recover.



The Waterfall

This maneuver has your plane flipping around the axis of the wing, while dropping. Starting from a high altitude, go to low throttle and gradually pull the nose up to near vertical. Just when the plane is about the stall, give it full down elevator and full power. Make attitude corrections with the rudder and ailerons to keep the plane flipping on axis. Cut the throttle and hold full down elevator as the plane flips around to nose high again, add power to flip it over again. Watch your altitude as to not get too close to the ground. Neutralize the elevator and add power to recover.



The Blender

This is a violent maneuver that starts with a vertical rolling dive that stops the descent as it changes into a flat spin. Start at a good high altitude, go to low throttle and push the nose down into a straight dive. Feed in full left aileron and complete 3 rolls, then immediately move your transmitter sticks to an inverted snap position, down elevator, left aileron, right rudder, all full throw. Now feed in high throttle to flatten the spin and stop the altitude loss. Recover by neutralizing the rudder and ailerons, and holding a little down elevator. After you gain some airspeed you can roll out to upright. Use caution as this is a violent and high G maneuver that will put a great deal of stress on the

