



# Cobra Hybrid Instruction Manual

Magnum Models  
4221 Deer Run Dr.  
Knoxville, TN 37912  
(865) 771-0821

[www.magnumrcmodels.com](http://www.magnumrcmodels.com)

Magnum Models would like to thank you for purchasing one of our kits. We would like to remind you to read the instructions before you start building this kit to avoid any mistakes that could cost you time in building.

We take great pride in the manufacturing of our kits in the hope of bringing you a quality kit that is easy to build and fly. We also take great pride in selecting quality foam and materials that should greatly reduce the amount of time and effort you will have to spend in the assembly of our kits. Remember our kits are built by flyers for flyers.

## **Be a Responsible Flyer**

Remember to fly only in areas that are safe for radio control planes. Never fly close to houses or power lines. Avoid areas with people like public parks. Magnum Models is not responsible for injury or property damage caused by this airplane. Remember FLY SAFE; be aware of who and what is around you.

## **Recommended Radio Equipment**

The radio equipment we use was chosen for its weight, durability, and power. The recommended radio equipment has been used successfully in the prototype COBRA and several customers' planes. The equipment you choose to use should have at least the same power/torque as this plane, in the right conditions it flies fast. We like to use metal geared servos for their durability and maintenance. It is easier to replace servo arms than the entire servo. If you choose to use servos other than those recommended, insure they are comparable in terms of size and power.

**BATTERY** – 300mah to 800mah flat packs will work. We like to use the largest capacity battery that will fit in the fuselage for two reasons. Larger capacity batteries provide longer flight times and reduce the need for adding lead (useless weight) to balance the aircraft. We recommend our 4.8v 2/3A pack for physical size and capacity.

**RECEIVER** – JR 600 and 700 series and Hitec 535 and 555 receivers are a good fit. We prefer to use the smallest receiver possible to reduce weight and because space within the fuselage will be needed to store the excess wiring behind the receiver. There are many other receivers available that will work, but when choosing your receiver keep in mind that the Cobra fuselage is smaller than most other foamies in this size range.

**SERVOS** – Hitec HS-82MG or HS-85MG servos are an excellent choice for the ailerons because of their small size and power. In the factory, airplanes we use either of these servos for the elevator.

# Tools and Supplies Needed to Complete This Kit

## **ADHESIVES, TAPES, AND COVERING MATERIAL:**

“Household Goop”, “Shoe Goo II”, Zap-A-Dap-A-Goo” or equivalent. For our airplanes we use “Goop” because it is readily available at most hardware stores.

Epoxy, 5 minute to 30 minute. The 5 minute is faster but slower cure rates are stronger.

Contact adhesive, 3M-77 or other spray type contact cement.

One inch and two inch filament tape.

Hinge tape – commercial hinge tape, Scotch Magic Satin tape or equivalent.

Covering – Ultracoat or any other low temperature heat shrink covering.

## **TOOLS:**

Hobby knife with number 11 blades, 6 inch or 12 inch ruler, 3/8” brass tube with the end sharpened, sanding blocks with various grits of sandpaper, “snap-blade” knife or other long bladed sharp knife, Dremel tool with 1/8” router bit (optional), ultra fine “Sharpie” or ball point pen.

**NOTE: Prior to beginning construction read the instructions carefully and study the drawings.**

## **Fuselage Construction**

1. Study the drawing and place your radio equipment on the fuselage in the indicated locations. The exact location for the equipment on your fuselage may have to be altered based on your choice of servo, receiver, and battery used, but keep the location of the equipment as close to the shown locations as possible as this will make balancing the Cobra easier.
2. Mark the location for the radio equipment on the side of the fuselage with a “Sharpie”. The battery should be as far forward as possible; however, there should be at least 1/4” of foam surrounding the battery following installation.
3. Transfer the battery and receiver locations to the top of the fuselage. Cut a cavity for the battery and receiver. The battery and receiver should be snug, but not so tight that it deforms the fuselage.
4. Trim the mounting logs off of the servo, cut a cavity in the fuselage side for the servo. The servo should be snug, but not so tight that it deforms the fuselage.

5. Cut the cavity for the switch in the fuselage. Insure the switch is located on the opposite side of the fuselage from the elevator pushrod.
6. Cut channels from the battery cavity, servo cavity, and switch cavity to the receiver cavity with the sharpened 3/8" brass tube.
7. Select the 1/4" x 1/4" x 6" EPP filler and the carbon fiber fuselage stiffener rod. Scuff and clean rod. Spray the cutout in the bottom of the fuselage with a liberal coating of 3M-77 (in order to keep over-spray to a minimum run a strip of one inch masking tape along both edges of the cutout and spray with the nozzle about 1/2" from the cutout). Allow the 3M-77 to dry for a few minutes, then carefully align one end of the rod with the tail end of the cutout in the fuselage and press the rod into the cutout. Align the EPP filler strip with the front end of the rod in the fuselage and press into the cutout. Allow this assembly to dry for several hours – overnight is best.
8. Temporarily install the battery, servo, and switch in the fuselage and wire to the receiver. Turn on your transmitter, center the elevator trim, turn on the receiver and install the servo arm perpendicular to the servo case. (See drawing).
9. Lay the elevator pushrod housing on the fuselage and align the center the elevator pushrod housing with the last hole in the servo arm. Mark the location of the pushrod on the side of the fuselage. The end of the pushrod housing should be about 1/2" below the elevator saddle. Keep the pushrod housing as straight as possible between the elevator servo and the pushrod exit point. The pushrod housing should end at the end of the fuselage.
10. Cut a groove in the fuselage as wide and as deep as the pushrod housing from the elevator servo cut out to the end of the fuselage. Cut the pushrod housing so that it will fit in the groove from the elevator servo cavity and end at the end of the fuselage. Spray the groove with 3M-77 and install the housing in the groove and allow to dry.
11. Make a Z-bend in the pushrod and install it in the pushrod housing with the Z-bend end at the elevator servo. Install the Z-bend in the servo arm. Trim the other end of the pushrod so that when the threaded coupler and clevis are installed on the pushrod, the clevis pin aligns with the elevator hinge line. Check for freedom of movement of the pushrod. When satisfied with the fit and freedom of movement, solder the threaded coupler to the pushrod.
12. Cut a slot 1/2" wide, 6" long and as deep as possible (down to the carbon fiber fuselage stiffener) in the wing saddle. The slot should be centered in the saddle and extend from the wing leading edge to approximately 1" in front of the wing trailing edge. This slot will be used for ballast and to store the excess wire from the aileron servos. The 3 oz. lead strips available in most hobby shops fit well in this slot or you can cast your own 1/2" x 6" ballast blocks.

13. Remove the receiver and cut a channel, with a sharpened 3/8" brass tube, from the ballast cavity to the receiver cavity for the aileron extensions.
14. Mark the location of the wing retaining blocks on the top of the wing saddle. The center of the front wing retaining block should be about 1" aft of the leading edge. The center of the rear wing retaining block should be about 1" forward of the trailing edge. Cut out the foam in the saddle so that the wing blocks sit flush with the top of the saddle. When satisfied with the fit of the wing retaining blocks, epoxy them in the cutouts.
15. Install the 6" aileron extensions in the receiver. Route the extensions from the receiver cavity to the ballast cavity. Drill a small hole from the receiver cavity to the outside of the fuselage. Cut a 1/4" deep slit down the side of the fuselage for the antenna. Install the receiver, battery, and elevator servo in their cavities and the antenna in the slit. Cut foam plugs to fit over the battery, receiver, and elevator servo. Glue the plugs in the fuselage over their respective components then trim the plugs flush with the fuselage surface.

## SHAPING THE FUSELAGE

1. Draw a line 1/2" from the top, bottom, and sides of the fuselage except in the wing and horizontal stabilizer saddle locations.
2. Use a snap blade knife or other long sharp knife to cut the corners off the fuselage. The fuselage should now look almost hexagonal.
3. Carefully shave the remaining points off of the fuselage.
4. Sand the fuselage to a "round" shape with 60 grit sandpaper. **Note:** When sanding EPP, **do not sand** with a back and forth motion or the foam may "chunk". Finish sanding with 100 grit sandpaper.

## TAIL ASSEMBLY

1. Taper the trailing edges of the vertical and horizontal stabilizers to a thickness of 1/16".
2. Sand a radius on the leading edges of the tail parts.
3. Temporarily install the horizontal stabilizer in the fuselage. Align the control horn with the pushrod and mark the control horn location on the elevator.

4. Remove the horizontal stabilizer from the fuselage; cut a groove in the elevator for the control horn and epoxy in place.
5. Sand a 30-degree bevel in the leading edge of the elevator to allow for control surface movement.

## TAPING

1. Remove sanding dust from the fuselage and spray the fuselage with contact adhesive and let dry to the touch. Lay a 1" strip of filament tape centered on the sides of the fuselage from the nose to the tail.
2. Starting at the tail, wrap strips of tape around the bottom of the fuselage and overlap the 1" longitudinal strip. To keep wrinkles to a minimum, cut the filament tape into smaller widths to allow it to form around tighter curves. After wrapping the bottom, wrap the top in the same way. **Note:** when wrapping the top of the fuselage insure the wing saddle is taped, and make sure the top wraps overlap the bottom wraps. **Note:** Make sure the wing and tail saddles are taped.
3. Scuff the tape with 120 grit or finer sandpaper to remove the mold release on the tape. The fuselage is now ready to cover.

## COVERING

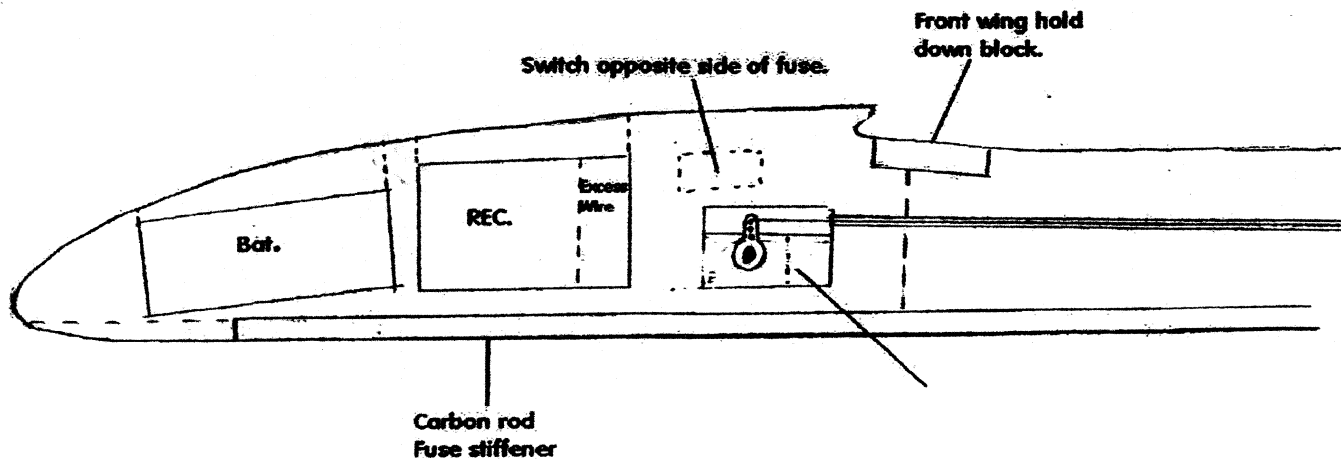
1. Cover the bottom of the fuselage, then the sides and then the top with Ultracoat or other low temperature covering.
2. Remove the sanding dust from the wing, spray a light coat of contact adhesive on the wing, and allow to dry to the touch.
3. Cover the bottom of the wing. **Note:** Wrap the trailing edge of the wing with the covering.
4. Cover the top of the wing. Wrap covering around the trailing edge of the wing so you seal the wing with the covering.
5. Cover the ailerons, vertical stab, the horizontal stab, and elevators.

# ASSEMBLY

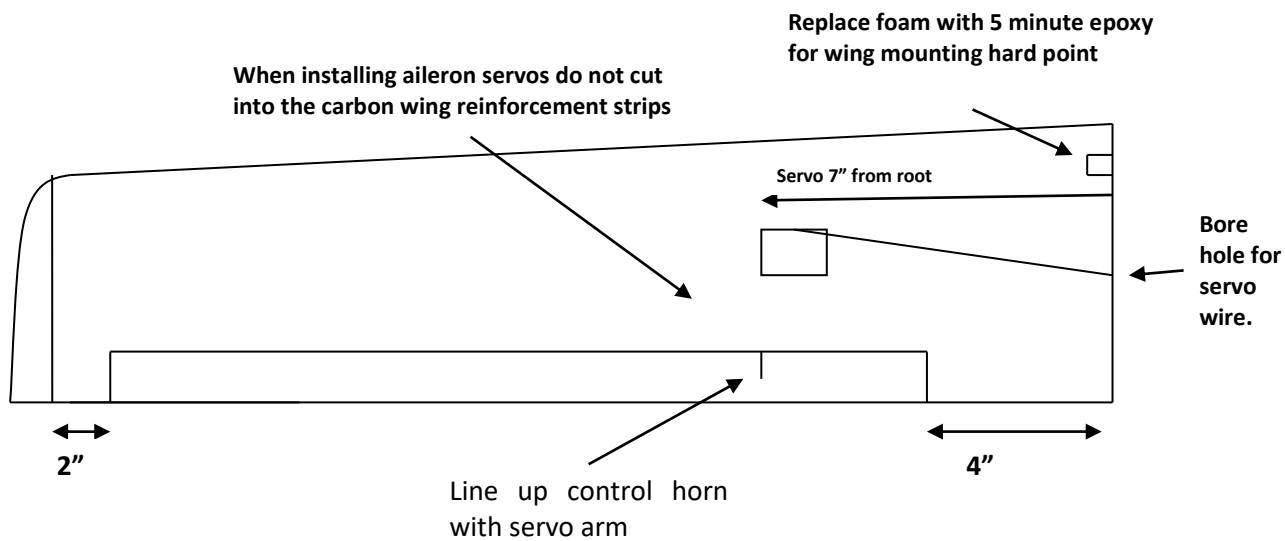
1. Hinge the elevator to the horizontal stabilizer.
2. Mount the wing to the fuselage. Use the wing to align the horizontal stabilizer and temporarily mount the horizontal stabilizer to the fuselage.
3. Align the stabilizer on the fuselage and glue it to the fuselage with 5 minute epoxy.
4. Cut a slot in the fuse ahead of the stab to accept the vertical fin and glue in place.

# CONTROL MOVEMENTS

1. Elevator –  $3/8$ " up,  $3/8$ " down.
2. Ailerons –  $5/8$ " up,  $1/2$ " down.
3. Center of Gravity –  $2\ 7/8$ " from the leading edge to start.
4. If you are flying the Cobra with a computer radio, you can set it up for reflex and flaps.
5. Reflex should be  $1/32$ " to  $3/64$ " up and flaps should be  $1/2$ " down. Start with an elevator compensation of 15% to 20%.



## Cobra Hybrid Wing Layout



### Dihedral

Lay wing upside down on table to get dihedral. Top of wing should be flat.