

INTIMIDATOR 2 Q500 INSTRUCTIONS

Thank you for purchasing what is still one of the best values in R/C Racing today. We have attempted to put together a very competitive kit at a reasonable price. This kit is a combination of ideas, techniques and experiences perfected by several people including ourselves. We hope you find the end result to be a product worth talking about favorably.

Before starting the kit, take two minutes to identify the wood pieces provided. Also, you will need the proper building and sanding tools. The order of construction is meant to be time optimized for one new or inexperienced person building just one aircraft. Experienced builders or racers may not need to follow these instructions.

Wing-

The reason for starting the wing first is to allow the wing skins to stay in the press for a minimum of 48 hours. During that time the fuselage and tail feathers may be constructed. The wing has a defined top and bottom so mark which sides are top and bottom on the ends of the wing panels. Mark the full husks and core of foam as one unit. It is important all three pieces stay together as a matched set. Lightly sand the fuzz off the cores. Be careful just to remove the fuzz...the cores/wood should already be at the proper dimensions. However, it is your responsibility to build the aircraft to the rules. It is possible for both the wood and the cores to be cut slightly undersized to do normal variances. Check this before sheeting the wings so that corrections can be made under the wood. Normally, the wing will be well over the minimum rule dimensions due to the new airfoil employed. Do not sand the airfoil with the thought in mind of making it thinner/faster.

Start with sheeting the wing first. During this process, be careful not to damage the trailing edge of the core. Before sheeting, measure the core and skins together to ensure they will be well over the 1 3/16" thickness required when complete. The wood is cut to match the cores, but please measure before you glue. As stated before, if the measurements taken indicate the wing will be over thickness, you should *not* sand down the sheeting for this will alter the airfoil used and give an undesired effect. If the wing is undersize, the thickness may be increased by laminating a 1/2" wide strip (48" piece the length of the wing) of 1/2 oz. to 2 oz. glass cloth between the wing sheeting and the foam core running along the high spot on the top and bottom of the wing. You can also reposition the carbon fiber strips a small amount. The normal position of the carbon fiber strips on the bottom of the wing is at 1/3 and 2/3 of the wing cord. Position the top carbon strip just in front of the high point of the airfoil. Make sure to put glue on both sides of the carbon strips.

It is now time to glue the skins. We have used carpenters' wood glue to do the wing sheeting with very good results with low costs. This glue must be allowed to dry for at least 48 hours. If the glue is not allowed to dry for more than two days, wing warping could result. When the glue has dried, the bond will be very strong and light, plus, the glue is cheap, water soluble and easy to work with. Epoxy may be substituted with excellent results, but it must be spread very thin to avoid weight build up. It is suggested that a finishing type resin be used so that it may be spread thin enough.

Begin by taking the 1/64" plywood trailing edge strips and beveling one edge. This will allow the balsa to flow smoothly from the foam onto the plywood. Once complete, lay the wings top side down and roll the glue on full strength. Do not thin carpenter's wood glue- it only adds to the drying time. Apply good even coverage without excess. A small 3-4" paint roller works well for this task. Coat evenly but not excessively paying close attention to the edges. Lay down the 48" full length carbon fiber strips- two on the bottom with equal spacing, one on top just in front of the high point. Add more glue to the carbon strips. Lay the top sheeting on the core. Allow only 1/8" overhang off the leading edge. Once the top side has been laid on, flip the core/skin combo over. Apply glue to the bottom of the core. Lay the 1/64" plywood onto the core ensuring the bevel is face up and towards the front of the wing. The plywood should overhang approximately 3/8" past the trailing edge of the foam. Now apply glue to the top of the plywood, and then lay the bottom sheeting on the core. Use several clothes pins with a straight edge to hold the trailing edge together while the glue sets. One half inch 'L' aluminum bars work well for this purpose. Weight the cores in the husks for 48 hours minimum. If you have the extra time,

leave the cores weighted a day or two longer. Make sure these are weighted straight on a straight surface. If the cores are crooked with the glue wet, then the cores will defiantly be crooked when the glue dries. Measure from the table up to the core all the way around the cores and ensure it is even. Shim as required.

Fuse-

While glue is drying on the wing the fuselage may be framed. Begin by identifying all of the wood required to build the fuse. The markings for left and right on the doublers are made on the sides of the plywood that will end up on the insides of the fuselage. Now take the 3/16" balsa fuse sides provided and laminate these to each plywood fuse doublers. To be clear, the doublers will be on the insides of the fuselage sides. There will be a left and a right side with doublers on the insides of the finished fuselage. Use the formers to align the doublers with the slots (tabs) cut for the formers. When gluing the doublers, it is important that the glue be spread on evenly and covers the whole doubled surface of the sides. Apply a light coat of glue. Epoxy or thick slow drying superglue may be substituted here. Once the plywood doublers have been aligned properly on the fuse sides, weight them on a straight flat surface to allow the glue to dry.

V-Tail-

The tails have now been laser cut. Clean all edges up square. While adding the 1/64" ply around the edges is not required, it does stiffen the edges up substantially. This is very beneficial when covering the model. Using a hinge slotting knife and fixture, slot the leading and trailing edges of the stabilizers. An alternate method is to use drill press with a 1" circular saw set at half the thickness of the wood and slotting the edges of the surfaces by sliding along the drill press' surface. This method works particularly well and is very quick to do. Once the surfaces are slotted, take the 1/64" plywood strips, and slide the plywood into these slots until it stops. Now wick thin CA top and bottom into this seam. Score the excess plywood with a knife and crack it away from the surfaces. Use an 80 grit sanding block to clean up these edges so they are straight and true. Now it is time to bring these surfaces into their respective final forms. The leading edge is tapered back and rounded at the tip. The trailing edge is straight. Slowly sand the leading and trailing edges down to the plywood to form an airfoil. An edge planar works well for taking large amounts of balsa down quickly. Exercise caution when working with a tool like this. Once the whole piece of balsa has been air-foiled, cut the piece in half to give two equal dimension v-tail pieces. Bevel the fresh cut roots of the stabs so that the surfaces fit nicely together with about a $110^{\circ}\pm$ angle between them- this is not a critical angle. Make sure the leading and trailing edges line up with no uneven gaps. Cut out the Elevators from each surface prior to gluing. Make the surfaces 1" x 7" long starting 1" in from the stab tips. Once the surfaces are cut out, glue the v-tails together at the proper angle and set the assembly aside.

Fuse-

Fuse construction begins with drawing a straight centerline longer than the fuselage sides on a suitable building surface. This will be the reference line all of the formers will be aligned to. Center lines should be laser marked on the front 1/8" firewall, front former, and two rear formers. Bevel the back end of the fuselage sides so that when they are put together, they allow the front of the fuse to be apart by 2". This sanded area in the back of the fuse should cover about 1". Glue the back end of the fuselage sides together and let dry. Insert all the tabbed formers into the fuse and hold the whole fuse together with rubber bands or clamps. The front firewalls will be skewed slightly to the right and down. Do not remove this angle, it is intentionally added. Alight all the centerline marks on the formers to the centerline mark on the building surface. Glue all formers when aligned. Measure the largest width over the rear of the wing saddle. It should measure 2 7/8" to be legal. If it does not measure 2 7/8", then spread this area slightly to achieve the proper dimension. Do this before adding the cross-grain sheeting the bottom of the fuse. Epoxy the 1/4" main firewall and 2 1/4" square firewall cap in place.

The bottom cross-grain sheeting may be installed. The top sheeting may be installed next. The reinforcement balsa triangle stock may now be added to the front tank compartment. Add the wing's hold down blocks at this time also. Triangle reinforcements may also be added to these blocks as well.

The landing gear plate can also be installed; we recommend epoxy. It is very important to add reinforcing to this plate. Before the top front sheeting of the fuse is added, some folks fuel proof the inside fuel tank compartment. This may be done by simply painting the interior with fuel proof paint or epoxy. After the fuel proofing agent has cured, fit the tank; the engine will be mounted at a later time.

Trim and sand the entire fuselage. Round all of the corners of the fuse to a 1/4" radius. Sand the fuse with progressively finer grits of sandpaper.

Read the next couple of paragraphs and understand them before attempting these steps.

Practice with the balloon before mixing the epoxy.

Now it is time to fiberglass the nose of the fuselage. It is advisable to use 2 oz. cloth so that it is not necessary to buy more than one weight of cloth. Cut the cloth in the shape of a 'plus' (+) sign. The center of the plus should completely cover the front of the firewall- therefore should be approx. 2 1/8" square. The 'legs' of the fiberglass cloth start from this center square and flare out slightly to match the sides of the fuse extending back 3". It is possible to envision how this shape will look by viewing the fuselage head on and imagining folding all four sides out flat towards the firewall. If in doubt about the actual shape, use a paper template for experimenting. Two overlapping strips can be used instead of a custom fitted piece of cloth. Make sure the cloth extends back 3-5" on all four sides. The next steps detail how to glue the glass to the front of the fuse.

Find at least two large party balloons- at least 18-20" in diameter, and a good sticky roll of masking tape. The balloon will be used to lay down the glass...more later. Only one balloon is required, but keep a second one handy just in case the first breaks. Now is the time to mix up the glue. Epoxy finishing resin has provided excellent results for this process. Begin by coating the nose of the fuse evenly with the epoxy using a small brush. Do not glob on the epoxy- spread it evenly. Place the fiberglass on the nose and lay down all four legs. Work out any wrinkles by pulling from the nose back towards the wing. Resist the desire to put on more epoxy. Add epoxy only sparingly. The next set of steps will go easier with a second set of hands, but one may manage by working slowly. Take the fuse, balloons and tape over to the closest set of stairs. Sit on the stairs and hold the fuse between your legs with your knees- tail side down! Pull off 6 pieces of masking tape each 8 inches long. Blow up the balloon as large as it will go, but do not tie the end- keep it pinched with your fingers. Now, place the top of the balloon (the end directly opposite the filling neck) on the firewall. While slowly releasing the air, push down and stretch the balloon around the front of the aircraft. The balloon must be stretched down to the wing saddle. Tape the balloon completely down and wrap extra tape around the edge of the balloon to keep it from receding back off the fuse. It will do no harm if some air is trapped inside the balloon. Allow this assembly to dry for at least 6-8 hours. Once the mixing pot of resin has dried, now the tape and balloon may be removed. The balloon may come off in pieces, but it will come off. The end result will be a very clean and strong front end that will require a minimum of filling and sanding to prep for covering. Clean up any edges and fill as required. It is better to have some small spots missing glue than to have an excess amount which only adds weight to the final product.

Wing-

Once the wings have completely dried, the leading edges should be trimmed and squared. Glue the 1/2" triangle leading edge stock. Shape and contour the front airfoil as needed. The leading edge should not be too sharp. Measure back from the leading edge of the wing 9.8"; mark in at least three places. Now, you may either cut the trailing edge off with a straight edge or you may run the whole core through the table saw. Begin sanding the trailing edges. Bring the trailing edge down to the plywood to a nice sharp and strong point. Be careful not to sand too far for as to decrease the strength of the edge. Glue and shape the 3/16" wing tips provided.

Now, the ailerons must be cut out. Make two marks on each wing panel at 8" and 18" measured from the wing tips on each side of the wing. Do this on the top and bottom of the both panels. These marks will be the 10" ailerons. Measure from the trailing edge of the wing back 2 3/16" in three places between the marks made at 8" and 18". Now CAREFULLY using a straight edge, cut out the ailerons. Using the 3/16" balsa sticks, glue pieces to the inside of the aileron cutouts to conceal the foam and give the hinges some wood to bite into. Measure back from the cut edge on the ailerons 3/8". Cut this 3/8" strip off each aileron and replace it with a strip of 3/16" balsa stick. Shape the wing and the ailerons

to continue the airfoil as it was before. Hinge ailerons, but do not glue hinges in permanently. Any type of hinge may be used. We recommend the use of the 'EZ' type CA hinges. These are readily available, and if installed correctly using thin CA, will survive a crank bending crash.

The next part of the process is to install the torque rods for the ailerons. Do this on the bottom of the wing. The torque rods will be imbedded into the wing from the ailerons to the center section of the wing. Draw a line from the back aileron cutout edge all the way to the center section of the wing. This line will run parallel to the trailing edge of the wing, 2" back off the trailing edge. Measure 1/4" on the either side of the center section wing joint along each of these lines and mark a spot. Staying on the side of the line near the trailing edge of the wing, cut a slot 1/8" wide all the way from the ailerons to the 1/4" marks. This slot must not be cut through the top sheeting of the wing. Remove only enough foam to allow the torque rod to fit in properly. Trial fit the aileron torque rod in the slot. Remove only enough material to allow the torque rod to sit in the slot and protrude out the slot on the centerline of the aileron.

A torque rod with or without a tube may be used. If a rod with a tube is used, then simply glue the lubed torque rod into the slot with a mixture of epoxy and micro balloons. It is not necessary to fill the entire slot with epoxy (epoxy is heavy). The remainder of the slot may be filled either with a balsa strip or a light filler. If a tube is not used on the torque rod, then the rod must be coated with a release agent so the epoxy will not stick to the rod. We have used 'carnauba' style car waxes with excellent results. Wait until the epoxy has dried before cracking the torque rod free. Fill in the slot and sand smooth.

When the glue has dried from the front firewall and the balloon removed, the wing may be trial fit to the fuselage. Mark the locations of the wing bolts. Carefully remove foam and balsa all the way down to the through the balsa top sheeting in 3/4" circles in the areas where the wing bolts will pass through- do not go through the bottom sheeting. These areas must be filled with epoxy for strength. Mix a batch of epoxy and micro balloons and fill these holes. Apply wide masking tape over these holes to keep the epoxy in place. Once the epoxy has dried, clean and sand area as required.

The wing may now be mounted to the fuse. Align the wing in the saddle with the center wing joint right on the centerline of the fuse. Measure from each wing tip to the tail of the fuse. The measurements should be identical, if they are not, adjust the wing appropriately. Make two marks on the wing and fuse in pencil so that the wing may be easily realigned if it accidentally gets jarred. Weight the wing to prevent movement.

Drill the holes for the wing screws using an under size drill. These holes must be drilled undersize, because the holes in the fuse mounting blocks must be threaded for the 1/4"-20 wing screws.

Drill the holes for the landing gear at this time also. Tap the wing and landing gear blocks, then go back and drill the holes in the wing to allow the wing bolts to pass through. These holes should be tight, not sloppy. Counter sink the wing bolts. Check the fit of the wing to the fuse. If there are gaps, fill with a mixture of epoxy and micro balloons or equivalent. Remove the wing for fiber-glassing.

Cut out two pieces of 2 oz. fiberglass cloth about 6 inches wide. Glass the top and bottom of the wing using either epoxy or polyester finishing resin. Lay down the glass and work the glue from the center of the wing to the outer edges with a small 3" squeegee. This technique will allow the glue to be spread on thin. Repeat for the other side of the wing. Sand and fill when dry.

Remount the wing to the fuse.

V-Tail-

A platform to mount the V on needs to be formed. Glue a piece of 3/16" balsa to the back end of the fuse. Leave a small gap in the back for the push rods if they are to be internal. Set the fuse with the mounted wing on a building block with an incidence meter and set the assembly up so that the wing is at +0.2 degrees. Most angle incidence meters do not have this type of resolution, so just make sure the line on the meter is to the positive side of zero. Now take the V-Tail assembly and sand a large flat area on the bottom of the 'V' right on the glue joint. Set the whole assembly on the back of the fuse on top of the 3/16" shelf created earlier. Place a round 'line level bubble' (the three inch ones used in masonry work found in the hardware store for \$2) in the middle of the 'V'. Fine a flat spot on the surface for this purpose. Rounded surfaces will not give a proper indication. Sand the front or back of the flat on the bottom of the V to achieve a level reading on the bubble. The stab should be set for 0 degrees. Measure from the top of tips of the Stabs to the front of the wing to ensure the assembly is square.

Sight from the front of the fuse to ensure the 'V' assembly is centered upright and not tilted to the side. If the measurements from the tips of the stabs to the wing are square, the bubble says you are level, and you are reasonable close to having the 'V' upright looking from the front, then the trims will be minimal. Glue the assembly on with thin/thick CA. Very important step- Fill in the entire side gaps with balsa. The front of the stab must be supported properly. Fill in the top groove with a balsa scrap. Install the light plywood in the tail of the fuse to ensure that there will be enough strength to epoxy on a tail skid. Make sure to note where the tail skid will be installed as to not to interfere with and pushrods.

Fuse-

Remove the wing and final sand the entire wing. Clean up all dents as required. Balance the wing by supporting the wing at the exact center of the wing on the leading and trailing edges. Weight the light wing panel with lead or pennies out at the wing tip to balance the wing laterally. The wing is now ready to be covered.

Obtain the engine/mount setup that will be used to power the airplane. Engine thrust lines are built into the construction- do not alter. Mark the engine mounting holes on the front of the firewall. Drill pilot holes as required. Be sure to drill one for the throttle cable. Use threaded inserts or blind nuts to hold the engine to the firewall. Drill the holes to accept these inserts and glue into place. Install throttle cables at this time.

It is suggested that the radio gear be pre-installed before the model is covered to lessen the amount of damage incurred later. Although this step may be skipped if time is a factor. It is recommended that the use of small servos and a light battery pack be used to keep the weight as close to minimum as possible.

The servos should be mounted in the main cabin against the back former. They may be mounted under a hatch in the tail, but there is no provision for this. The back former has a large opening to accommodate internal or external pushrods depending upon configuration built.

Once the radio gear has been trial fit, remove all hardware and gear. Final sand the entire fuse and fill as required. Be sure to plan for pushrod and switch exits if needed.

Cover the model in the method of your choice. Seal all hinge lines- both ailerons and elevators. Once covering/finishing is complete, reinstall all hardware, engine, tank, and radio. Metal to metal connections on the pushrods must be avoided. Attempt to use 'Z' bends wherever possible.

The surfaces will now need to be hinged. If you use the thin CA described earlier to glue in the hinges, keep a bottle of fingernail polish remover handy to remove any excess CA. The fingernail polish remover is diluted enough so that it will not attack the plastic covering, but will dissolve any excess CA fingerprints that eventually will show up.

Final Checkout-

Check the CG with the aircraft completely ready to fly less fuel. It should fall somewhere between 2 1/2" and 2 3/4" with 2 5/8" being ideal. Set the surface throw for +/- 3/16" for the elevators and ailerons. These are just starting points and must be tailored on the trim flights. Note that the rudder is sensitive and should be cut back to only use what is necessary. It is highly recommended that the ailerons be setup for 40-50% expo and the elevator set for 30-40% expo.

Once you have double checked all of the settings and screws for safety, then it is time for the trim flight. If the wings were built straight, the test flight will rather uneventful. Set the 'racing' dual rates to achieve a turn diameter of 80-100 feet with full 'up' elevator deflection. Also, set full aileron deflection to achieve no more than 1-1 1/2 rolls covering one length of the race course. Check the aileron deflection and rate in both directions. If flying with dual rates, set the 'high' rates for max aileron deflection and a higher deflection of elevator being mindful that too much elevator will just stall the aircraft.

Good luck and have fun.