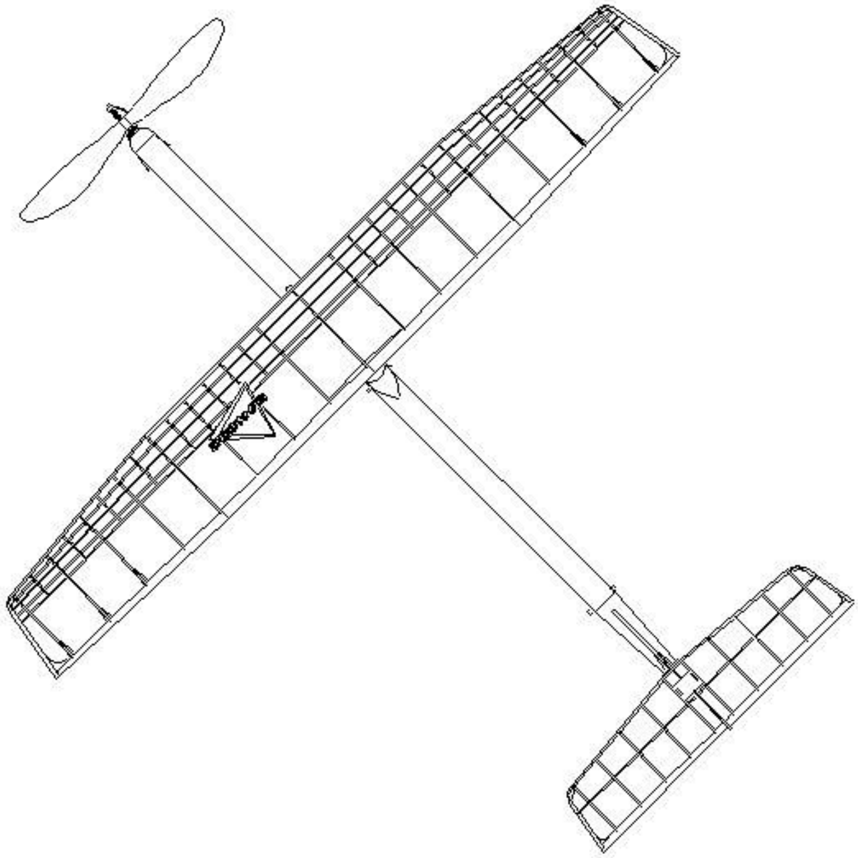

BOOMER

Mark III

Construction Manual

Kit No. CBMD-001

CB Model Designs

www.cbmodeldesigns.com

Congratulations on your decision to purchase this kit! Every effort has gone into making the Boomer one of the lightest high performance P-30 designs available. Each kit has been fabricated from select wood for a light airframe that can meet the minimum 40 gram airframe weight for this event. It is an excellent transition model for free flight competition and just plain fun sport flying.

Adhesive and general assembly process recommendations

Cyanoacrylate adhesive (CA in this instruction) is should be used with discretion and caution. Assembly of the basic structures is best achieved with white glue or cellulose cement (Duco, Testors, Ambroid, etc.). Use of these types of adhesive offer the best chance for any minor adjustment during assembly, and minimizes the chance of adhering the structure to the plan or building board by thin glue wicking through pin holes in the parchment paper covering the plan. This in turn reduces the chance of part damage when removing a structure assembly from the plan when complete. All parts should be pre-assembled dry before any bonding occurs to check for proper location and fit. Proceed carefully and take your time with the assembly process. A Boomer can easily be constructed and made ready to fly in one week of evening work sessions. Please read these instructions thoroughly in conjunction with study of the kit drawing and supplement sheets before starting construction. A comprehensive construction photo documentation PDF file is available as a free download from our website www.cbmodeldesigns.com within the Boomer product page.

Wing Assembly

Review the laser part number sheet before starting to understand the part arrangements and numbers. Mark any items that look like they would be confusing to sort due to similar size and shape. Start wing construction by covering the construction drawing with parchment paper to prevent parts from sticking during assembly. The use of balsa strips 1/8" thick x ¼" or wider is suggested as boundary control to the wing plan form outline. Pin this material at the edge line for TE-1 to start. The wing tip panels have washout built in during construction, and TE-2 will not be held against the building board during assembly as done for TE-1. Use thicker balsa to provide a boundary edge that still controls the plan form location of TE-2 while it is rigged for washout during assembly. Trailing edge section TE-1 is shimmed 1/32 at the forward edge to provide tilt that approximates the under camber of the wing section, with the aft edge touching the building board surface. TE-2 is not going to be assembled against the board surface, but run the shim under TE-1 past the dihedral break for the wing tip to allow TE-2 to be tilted in the same manner at the joint area. For assembly purposes with the tip ribs, make a shim that tapers from a point at the dihedral joint to 1/8" tall at the joint plane with the tip rib T-1. You can leave excess beyond for pinning, etc-this will be cut off when installing T-1. Make the shim from 1/16 balsa or thicker material and slide under TE-2 near the front edge to help support this part when installing the ribs. With the tilted position of TE-2 set by the inboard shim, adjust the tapered shim inboard or outboard as needed to obtain a fit that is flush to the bottom of ribs W-2 through W-5. Ribs W-1 are also set flush to the bottom of TE-1; this is achieved by allowing the lower rib edges to rest against the 1/32 shim used to tilt TE-1.

Begin assembly by dry fitting the W-1 ribs over the spars notches and into the TE-1 notches. Adjust the position of the spar segments and trailing edges to achieve best fit of all parts to the drawing. Dry prefit the tip panels next. Note that all the tip ribs have standoff tabs to support the trailing edge of the rib in proper location for washout. TE-2 is shimmed up until it is flush to the lower edge of each tip panel rib as described above.

Dry fit the ribs and spar to the plan and by inserting the rib ends into the trailing edge notches related to them. I position the spars inboard and outboard to maintain the dihedral break joint locations, etc, and add some blocking against the plan to bridge the joint area while gluing together the wing frame. Once the rib/spar assemblies are positioned accurately you can add the LE-1 & -2 parts against the forward ends of the ribs, using blocking to maintain alignment to the drawing and maintain restraint against the rib ends. I glue the ribs, spar notches, leading and trailing edges to the rib ends at this point. Do not install the W-1 ribs at the wing center and polyhedral joints yet; these will be installed when the dihedral is added.

Add the sub ribs W-1A, etc. between the spars and leading edges where shown on the drawing and per the notches in the spar associated to them. Install the WG-2 stiffeners on either side of ribs W-3, W-4 & W-5 at the trailing edge of the wing. These are installed to be a little above the rib profile as shown in View D-D on the drawing. The stiffeners add strength to keep the trailing edge from twisting as well as prevent buckling of the thin rib sections from the wing tissue covering tension.

Install the tip rib T-1 by adding one of the T-3 gussets to the back side of LE-2, against the building board surface. A second T-3 gusset gets glued on top of this to result in a 3/16 thick gusset, but you can to that after the tip rib is installed. With a sharp razor, cut off the wild ends of WS-2, LE-2 and any of the tapered shim that projects beyond the joint plane of the tip rib to TE-2. Nest T-1 against the ends of these three parts and adjust forward and aft for best fit, leaving enough to sand flush with the trailing edge. The lower surface of the tip rib should be flush to the bottom surface of TE-2 if you have the tapered shim positioned to maintain a 1/8" offset at the joint plane with the tip rib. Glue the rib, and then add the T-2 gusset-this should be flush to the lower surface of TE-2 tapering to flush with the top of T-1. Add the second T-3 gusset on top of the first. Repeat for the opposite tip.

Add the 1/16" square turbulator spars next. At the dihedral and polyhedral joints, allow ½" overlap of the spars to allow the scarf joint to be made when the dihedral is added. Again, no W-1 rib is installed yet in these locations.

Remove the tip panel from the drawing carefully. Using a fine sanding block, VERY LIGHTLY sand a shallow bevel at the end of TE-2 and LE-2 where they join the inboard wing panel and form the dihedral joint. The material cross section is so small there is very little sanding required-you can easily overdo this. Note the laser burn color change at the end of these parts to judge how much material is removed. Carefully rig the tip panel at the dihedral dimension for the tip shown on the plan and inspect the resulting joint at TE-1 and TE-2 and also the LE-1 and LE-2 for little or no gap. If this area becomes over sanded, a small filler of balsa can be added during the bonding process to correct.

Move the tip panel out of the way to install the W-1 rib onto the inboard wing panel still on the board. Carefully tilt and slip into place under the excess turbulator spar ends and onto the WS-1 end that is notched to fit. Check the alignment to LE-1 and TE-1. Position the outboard rib angle gauge against WS-1 and W-1 to provide the tilt toward the inboard side of the wing. Check alignment of the rib for being on center to the dihedral joint, and bond in place; do not glue in the turbulator spars yet.

Place the tip panel back into position with dihedral as shown on the drawing. Plan form align to the drawing using the blocking to trap the tip panel in place. Make sure the end of WS-2 is correctly against the end of WS-1, and the LE and TE joints are touching. Once satisfied, bond the inboard end of WS-2 to WS-1 and W-1; LE and TE joints. The turbulator spars should still be left with the excess on either side of W-1, and nothing glued into the notches in W-1 yet.

The next step requires a very sharp, fine razor to perform.   Do not attempt with a #11 knife blade. One half of a new double edge razor is recommended, although an extra fine single edge razor is almost as good.   The process requires light pressure and a very fine blade is best used to perform the cut.

At the dihedral joint, the turbulator spars are overlapped on top of each other, with the lower one positioned in the W-1 notch. Using the razor, slice down through the stack of spar material at a diagonal similar to what is shown on the plan, centered on rib W-1.   The resulting scarf joint should slip into the W-1 notch, straddling the rib.   Bond this in place and repeat for the rest of the spars.   Direction of the scarf joint is not important, only that the joint has no gap and is a shallow angle as shown on the drawing to transfer wing bending loads effectively.   If a gap results in the joint after cutting, make filler from thin balsa that can regain contact with both joint surfaces and bond in place.   Cut the excess fill material off after the glue has dried. Resist all urges to add additional doublers at the dihedral joints.   This wing has never had a failure at these joints the entire time this design was being test flown and used for competition flying, including some very hard crashes.   Good joint quality is a must however!

After both tip panels are rigged for dihedral, follow a similar procedure to rig one half of the wing to the center dihedral angle shown.

Wing sanding and shaping
Begin shaping the wing by profiling the wing tip leading edge to blend into T-1 and match the radius shown on the plan.   Clean up the wing edge profile to remove any mismatches and inconsistencies. Remove the stand-off tabs from the spars, tip panel ribs and T-1.

Make a contoured sanding block to use for light sanding of the wing underside-a pattern is provided to use as a template.   To the contoured block surface bond a strip of 120 grit sandpaper the same width as the block.   On the opposite side bond another strip that would be a flat surface to use for sanding all other areas of the wing.

Start the wing sanding and shaping on the underside to start.   Sand the lower surface of the leading edges to be flush with the lower edges of the ribs.   Inspect the lower surface of the trailing edge for flush fit to the ribs, and at the dihedral joints.   As the trailing edge segments were tilted to approximate the under camber shape of the airfoil, it should take only minor sanding to improve this area if you were careful in setting all the ribs flush to the bottom surface of the trailing edges during assembly.   If conditions look flush and fair, only minimal finish sanding is suggested.

The best way to sand the trailing edge is to place the wing upside down against a flat surface that allows one section of the trailing edge to be held flat against it while the adjacent areas with dihedral are allowed to drape off either side.   Typically this would be the corner of a table or other raised working surface that will allow the other areas of the wing to be in the clear as you restrain the one section of wing for shaping.

Once the leading and trailing edges have been blended flush to the bottom edge rib contours, use the contoured side of the sanding block to very lightly touch up any areas of the under camber for flush condition at the lower edge of the rib and wing spar joints.   Make sure the wing spars are flush with the W-1 rib at each dihedral joint.   Work the underside of T-1 to be smooth and flush with WS-2 and TE-2 / T-2 contours.   Leave T-1 as a rectangular cross section for now.

Shape the upper surface of the wing by sanding down the LE-1 and LE-2 contours to be flush with the rib edges for the upper side. Once the leading edges are blended flush with both the upper and lower rib profiles, finish the leading edge radius to a fairly sharp blend-approximately .06 radius or what is shown on the wing cross section on the drawing. Use the flat side of the sanding block to carefully sand down the tops of the turbulator spars to level these in to the contour of the wing-it doesn't take much sanding here. Blend the top of T-1 lightly to complete the necessary profiling to fair this in with the wing contour. Now blend off the tops of the TE-1 and TE-2 trailing edge segments until flush with the tops of the ribs and any of the projecting WG-2 stiffeners sanded flush as well. Again, this is best performed by holding one section of wing at a time against the workbench edge and carefully sanding just the top of the TE- or TE-2 to locally shape and refine until the wing contour is represented.

Use a small piece of 120 grit sandpaper for fine shaping all areas of the wing and blending corners. The lower outboard edge of T-1 is radius blended to the upper outboard edge to remove all boxiness to T-1 and provide a streamlined shape to the wingtip. Continue to finish sand the wing with 220 and 320 grit paper until you are satisfied with the smoothness of the result.

Install the two wing D/T hooks WH-1 and WH-2 as shown on the drawing-add the scrap fillers around them as shown to provide tissue attachment areas. Sand the fillers flush with the center rib contour.

Finish the wing substructure with one coat of full strength nitrate dope, lightly sanded with 320 grit when dry. Follow this with an additional full strength coat of dope to seal the grain where the covering is to be adhered. This means the entire framework on the lower surface of the wing needs to be edge sealed, as the tissue covering will be adhered to each rib and spar to maintain the under cambered airfoil contour. Seal the entire leading and trailing edge, top and bottom. Seal the T-1 rib completely and edge seal the tops of the ribs at the dihedral joints. Any additional tissue color breaks based on the wing structure should also be sealed to allow tissue attachment at these locations.

Horizontal stabilizer assembly

Assemble and finish the horizontal stabilizer in the same manner as the wing. Mark the location of the D/T hooks S-2A on the sides of the S-2 ribs. Prior to installing the S-2A's to the ribs, I suggest installing the 1/32 sheeting between the S-2 ribs, bridging S-1 as shown on the drawing, in the area of relief on the upper rib edges. This can be slotted after installation for the top end of the hooks using a very sharp razor. Check for hook fit through the slots and install the hooks from the underside after covering the top of the stab with tissue, then finish the bottom tissue covering.

After covering the stabilizer, add the filler and D/T connector eye on top of the stab. Add tissue doublers underneath in the area of the stab platform, and over the D/T connector eye to strengthen this area and provide a clean finish.

Vertical stabilizer assembly

The fin assembly is straightforward-just assemble over the drawing using the laser cut parts. When dry, sand the F-1 segment to a tapered shape as shown in the plan view of the fuselage, and round off the rest of the fin outline. Apply two coats of dope to the outline parts after fine sanding and then cover with tissue provided or the covering material of your choice.

Fuselage assembly

Fuselage final assembly involves mainly the installation of the timer and dethermalizer system and installation of the fin and stabilizer platform assembly.

Assemble the stabilizer platform from the parts included. I suggest using a round shape about ½" diameter with sandpaper around it to lightly radius the underside of the balsa platform to give a clean fit to the tail cone when installed. To install the fin, there are alignment marks provided on the upper surface of the tail cone. The aft marks set the trailing edge location for the fin, which also ensures the incidence screw head contacts the trailing edge of the horizontal stabilizer at the right location.

Set the fuselage onto a flat building surface. It needs to be held with the pylon side perpendicular to the building surface. As an alternate method, you can run 1/8" diameter wire or tubing through the motor peg holes and support with equal dimension blocks on either side to level the fuselage to the building surface.

I suggest using cellulose glue such as Duco, Ambroid, etc. to install the fin to the tail cone. Make a temporary jig that can establish a perpendicular reference to the building surface that the fin can be held against in the correct location while the glue dries. Once satisfied with your setup, glue the fin into place and allow to dry before installing the stabilizer platform. Dry pre-fit the stab platform-checking for eyeball perpendicularity to the fin, pylon, etc. I suggest setting level and shimming in the stab tilt after. Glue the stab platform to the tail cone, the trailing edge of the fin against the end of the fork slot in the platform for correct stabilizer location.

Install the curved aluminum guide tube segment for the stab D/T lanyard. I suggest you make sure the D/T line will pass through this prior to gluing into place. Do this by using thin CA to harden several inches of the D/T line material to give it a wire like stiffness. Test feed this section through the tube to verify smoothness of movement.

On the pylon, install the plywood adapter plate for the Badge timer. An adapter plate is also provided for a Button viscous timer if desired. I also suggest you enlarge the plywood adapter plate pilot holes for the timer attachment screws prior to installation to make this easier when installing the timer mounting screws after.

Install the D/T trip wire assembly as shown on the drawing. Use the laser cut fillers to fair in the tube and strengthen the joint. Install the timer actuator lanyard aluminum tube as shown on the pylon right side in a similar manner as done for the trip wire.

Holes have been pre-drilled in the pylon for the wing peg and the wing D/T fairlead at the front of the pylon. Carefully press in the swivel fairlead at the front of the pylon until both eyes are exposed on either side of the pylon-no glue normally required. Cut the wing peg to length and install-note the offset on the left side to allow space for the timer lanyard to wrap around. Install the wing trailing edge stop PS-1 as shown in the fuselage top view.

Install the small barb on the underside of the tail cone where shown for the stab D/T bands. Similarly, install two barbs to retain the nose block assembly if desired-this is optional as the Gizmo retains motor tension and normally prevents nose block movement.

I recommend leaving the fuselage uncovered with tissue to minimize weight. Apply two coats of thinned dope to everything, lightly sanded between coats with 320 grit paper and let it go at that. It may seem the fuselage will split easily without covering, but I trade weight gain for that risk as part of my P-30 strategy. Splits occur, but not very often and are easy to repair on the spot generally speaking. However, check your weights as you build to see if you are going to be underweight when finished. If so, adding tissue reinforcement to the fuselage tube is a structurally good way to add some extra weight instead of clay or lead.

Nose block assembly
There are 5/32" diameter holes in the center slugs of the nose block laminate discs. These can be punched out and used for alignment purposes as well as supporting a machine screw or wire mandrel used to turn down the nose block assembly to the contours shown on the drawing.

Start with assembly of the two NB-2 parts, using a 5/32" diameter tube or wire as an alignment pin, and by alignment of the notch in the bottom for the key. I suggest tack gluing with thin CA at about 120 degree positions on each joint at this time. It will make it easier to remove center slugs in the following steps and not allow the assembly pin to be accidentally glued in.

Now assemble the two NB-3 pieces along with the plywood NB-4 backup plate using the alignment pin and key notch. Remove the slug in the NB-3 disc that will be adjacent to the NB-2 disc, on the forward side. Leave the remaining slug in NB-3 & -4 in place for turning the final assembly.

On the NB-2 subassembly-remove the slug that will be adjacent to the NB-1 ring. Place the NB-1 ring onto the alignment pin and go ahead and glue the entire joint to adhere to the NB-2 stack. Be careful to get NB-1 as concentric as possible with the NB-2 for an all around flush fit into the fuselage tube.

For the final assembly, slide the two subassemblies together. You should have the forward slug in NB-2 at the center of this assembly as a result. There needs to be space to help collapse and draw the slugs out of the assembly after turning which is why certain slugs were removed. Go ahead and finish gluing the joints that were tack glued earlier.

After the assembly is completed, use a #10 machine screw through the assembly to use as a turning mandrel. The nose block needs to be held tight to this for turning-install a small washer on the front of the block assembly, a larger diameter than the slug and make that the end for the screw head. On the back end install a washer 7/8" diameter or slightly less to apply clamping pressure when a nut is installed. This keeps the slug pack from pulling through while tightening. You can make custom washers easily from 1/16 or 3/32 birch ply if metal ones cannot be found.

Install the assembly into a drill press or hand drill and turn down the balsa stack to fair together and contour to shape. I use a course carbide grit file followed with sanding blocks then paper strips down to 320 grit to get a fine finish. Rough sand the stack into a cylinder first and check to see how flush it is with the fuselage outside diameter. From that edge forward shape the blend down to the diameter of the NB-4 disc. Finish sand and you are done.

Disassemble the washer from the front of the assembly and then replace the screw, keeping the rear washer in place. Tighten the screw again to press the center slug toward the rear, eventually you should be able to break all of this loose and pull out the slug cores.

Roll some sandpaper around a cylindrical object that will still fit loosely into the relieved area for the Gizmo collar and light sand away any tab nubs and such that could cause a snag on the prop collar. I then soak the inside of the hollowed out area with thin CA to reinforce this material and help prevent cracking.
Install the alignment key in the slot and fit up to the fuselage to establish the index slot position. Notch the fuselage for a no slop fit with the alignment key. I suggest the key surface be slightly proud of the fuselage surface to prevent any chance of it slipping under the edge of the notch in the fuselage.

Using a jewelers rat tail file or similar, enlarge the three clearance notches for the Gizmo prop button. I wrap sandpaper around a pencil or dowel and lightly sand the prop bearing bore and test for a smooth fit completely into the nose block using the prop assembly. Install the Gizmo prop assembly per the instruction sheet provided after finish sealing the nose block-I use Duco cement to allow removal later and minimize risk of fouling the mechanism when installing.

This completes assembly of all the basic components-cover the wing and stabilizer assemblies. I recommend Esaki tissue covering or if plastic film is desired ½ mil mylar seems to work best. I have tried Microlite film covering but find the Boomer flying surfaces cannot tolerate the shrink forces of this material, and for me anyway, the results unacceptable with significant warping. On tissue covering-I seal with two coats of 50% thinned nitrate. A finishing tip to minimize warps is to seal one rib bay at a time, top and bottom. Skip the adjacent bay and seal the next one, etc. When these are dry, repeat the process for the remaining bays then start over for the second coating. The interrupted application of dope and the resulting shrink will help with undesirable warps in these delicate structures.

Dethermalizer system installation
The last remaining task prior to flight testing is calibration of the D/T timer and installation of the D/T line for the stab pop-up.

Install the timer on the model. Make a loop of D/T line stock about two inches long and tie onto the D/T spring. Tie the other end of the spring onto a length of lanyard thread stock, and with the wing temporarily installed, attach the loop on the spring over the timer barrel to anchor it. Then rout the lanyard aft around the wing peg, forward to the fair lead eye up and through the forward wing hook and back down through the opposing fair lead eye and aft to the 3/32 diameter alum bung tube. Pass through the tube and review the setup. With the loop over the timer stem to anchor, the tail end of the D/T spring should be forward of the peg by approximately ¼". If the spring is riding or wrapping the peg, you need to shorten the forward lanyard loop until the spring tail clears a minimum of ¼".

Make a lanyard capture plug from a cutoff end of a toothpick, or taper a piece of balsa to a cone to serve as the plug. Pull the timer lanyard slightly taut and install the plug to start the timer tension setup. Now go back and position the timer arm slightly forward of the vertical position and place the lanyard loop over the arm to apply tension for the rotary action. At this position the timer should be turning almost imperceptibly but release the spring. Adjust tension for faster or slower rotary motion by pulling or loosening the tension in the lanyard. You can do this by gently pulling against the tube plug until an acceptable speed is obtained. Try and get the longest run time you can from one full turn of the timer if you plan to do serious contest work, as a mere two minutes run time will not be competitive with this model. Once you have bench tested the setup for reliability you can secure the tube plug with a small blob of cellulose cement. This will allow softening with acetone if needed to allow re-calibration later. I also suggest a small dot of cement be applied to anchor the excess lanyard tail in case something goes awry with the plug the lanyard will not simply pull through under tension and be lost in flight, etc.

Secure all lanyard knots made with a drop of CA to keep these from coming apart in use. Trim off any excess thread from the knot ends.

The D/T line is installed next. Tie one end of the thread provided around a 1/8" diameter wire to form a loop. Trim off the excess thread from the knot and slip the loop off the wire. Apply thin CA to the formed area-this will saturate and solidify to maintain the shape of the loop. This forms the ring that will attach the D/T line to the connector eye on the stabilizer. Open the connector eye slightly if necessary to allow the loop to slip into place.

Install the stabilizer onto the platform with tensioning bands for the pop-up motion. Tie two of the ¾" diameter bands together for the proper length. Feed the unfinished end of the D/T line through the formed guide tube at the end of the tail cone, and the formed loop onto the connector eye on the stab. Slip the short 1/16" diameter aluminum tube onto the D/T line. Place the timer spring lanyard of the stem of the timer to tension the spring and lanyard as set for flight with the trip wire leg under the lanyard. String the loose end of the D/T line through the band and then shorten the line with the band placed on the short end of the trip wire as shown on the drawing. Pull the thread end aft to apply tension to the band and draw the stab down against the top of the incidence adjustment screw. Note the location where the line turns through the tensioning band as this is where you need to tie a second loop and harden with CA as done for the stab connection end.

Allow the stab to deploy to the D/T position. Keeping slight tension in the D/T line, slide the 1/16 stop tube up the line until it is against the front end of the guide tube. Lightly crimp the forward end of the stop tube to anchor it to the D/T line. Pull forward to move the stop tube away from the guide tube and apply a drop of CA to the tube and line to secure. Test the operation of the D/T system to confirm consistent operation.

Assemble the model and apply wing and stab keys as shown on the drawing for the wing and horizontal stabilizer.

Flight trimming-glide phase

Install a 10 gram motor using the aft motor peg location. Establish glide trim using this position as the baseline for trim flights. Assemble the model and adjust the incidence screw until the stabilizer is neutral incidence. Use cellulose cement to attach a 1/32" thick shim to the right side of the stab platform such that when the stab is pulled down to flight position it is tilted with the right tip up about 1/8" higher than the left, as viewed from the rear of the model. Taper the shim to make sure the contact with the bottom of the stab is at the edge of the stab platform.

If possible, find a shallow hill from which you can launch the model for test glides. Do this under calm conditions for best results. The objective is to observe the glide path for stalling or diving, and also to obtain a right hand glide circle. Hand wind some turns in the motor to give the prop some revs as the glide starts and get the prop up to free wheel speed. Launch the model gently-wings level. Observe for the glide angle fast, or pitching repeatedly in a series of shallow stalls, or it may be just perfect. Adjust the stab incidence screw until the glide is shallow, slow and steady and turning to the right as it settles to the ground. Observe the right hand turn during the glide; this should be roughly 30 feet in diameter. If it is a tight spiral, remove some of the stab tilt by shaving or sanding off some of the shim. If there is little or no turn, add more shim to increase the stab tilt. Make sure the stab will still pop-up completely with the stab tilt in effect. Make sure the glide is safe and consistent before moving on to power flight trimming. If you built the model as shown on the drawing there should be no need to add ballast for center of gravity adjustment.

Flight trimming-power phase

Before first powered flights add some down and right thrust by adjusting the Gizmo prop per the instructions include for this. This will be fine adjusted as you go, but will prevent damage to the model from deep power stalling on the first flight attempts.

Hand wind the motor to about 300 turns. Set the D/T timer for short duration (20 seconds or so) and gently launch the model, wings level. Observe for a right hand shallow climbing turn. If there is no turn, you need to increase the right thrust. If the model pitches up into a stall, more down thrust is needed. Make these adjustments until the model climbs evenly (no stalling) and to the right. Again the turn needs to be roughly 30 feet in diameter at low power. Adjust thrust angle until the model becomes predictable and safe under low power. Now begin lower power flight using a torque meter to make observations about power in the motor and the effect on climb trim. Stretch wind to 3-3.5 in/oz torque and launch. The model should still be fairly shallow in climb, but with much more duration. Again observe the climb characteristics for turn and stall-adjust thrust angles slightly if necessary. Also watch for the glide transition and glide pattern that follows. The model should transition to a slow floating glide with a right hand turn pattern. It may be necessary to adjust the stab incidence slightly to obtain a good glide after the power runs down. You know you are in the sweet spot when the model glides with a very slight tendency to nose up when encountering minor turbulence-it gives the appearance of wanting to 'sniff' or climb slightly with the slightest buffeting.

Continue to add more torque on subsequent test flights. Fine adjust the thrust angle to control the climb characteristics. The target is to obtain the maximum climb performance profile for the model. Too steep and the power is wasted on overcoming the drag of the high angle of attack. Too shallow and fast is obviously not going to offer duration gains from altitude. The model should be climbing slightly faster than glide speed to be on a good climb performance profile. At higher power the turn may tighten somewhat, but this can help on a steep climb during the power burst to prevent stalling and is desirable. If the model banks heavily to the right under high power and does not climb, you need to remove right thrust until the model flattens out and climbs in the turn.

This model has been flown in torque ranges of 3 to 10 in/oz with no problems within the trim setting once established.

Now try some powered flights using the forward motor peg location. This position is to facilitate a 10 gram motor that is shortened into a thicker cross section for higher torque. The center of gravity will shift forward significantly when changing motor peg locations. As the model is already trimmed for power and glide at the aft peg location, the easiest way to deal with the center of gravity shift is to add a ballast weight at the end of the tail cone. Use a small ball of clay (about 1 gram) applied to the top of the tail cone, under the stab and in front of the incidence screw. Check the balance point and perform some test glides to verify the trim settings are still correct to what was demonstrated earlier. Add or remove ballast to fine tune the glide angle to what it was like with the motor at the rear peg location.

Power flights can then be undertaken-use lower power and short D/T on the first one to make sure nothing is upset by the new motor location. Then start power trials using the maximum torque level you tested on the longer motor. Watch for excessive right turn as the power increases-some of the right thrust may need to come out, and down thrust increased to handle the additional energy. These will be very small changes-make them carefully.
After adjusting the model with clay ballast, remove and save after the flying session. In a contest, you will need to re-install if you decide to change motor strategy to suit conditions.

Learn all you can about the performance potential of your model by experimenting with various motor sizes using 10 grams in each case. Long power cruise (1:40 has been demonstrated fairly consistently and often 2.0 minutes is easily obtained) can be had on a 4 X 1/8 SuperSport motor. This motor can only take about 3.5-4 in/oz. of torque and does not offer a robust climb. It will allow a long hunt for lift, and in light conditions will often yield max time easily without the model getting very far off the ground. If any lift is contacted the model will climb for quite some time and towering height can often be achieved in this manner.

Similarly, a 6 x 3/32 SuperSport motor will offer a long cruise (1:25 consistently) and better climb performance. This motor can take up to 5 in/oz. of torque consistently. 1/16 motor stock also offers some interesting configurations and power output-don't overlook the potential of this rubber as well.

Use the forward motor peg location for 6 X 1/8 , 8 X 3/32 and 12 X 1/16 motors and high torque ranges. You don't have the motor run duration (45-53 seconds typically), but you will gain altitude rapidly. This type of motor is probably best suited to turbulent conditions when you need to get high above the ground quickly into smooth air.

As you gain knowledge about power potential the various motors configurations offer I suggest keeping a log book on the airplane and motor configurations to refer to for contest work. Also note the torque applied and the run times observed to provide a consistent and doubt free base line when in competitions.

Make sure the motor is well lubed to prevent binding in the motor tube. The use of an oversize tube on the tail end of the motor is suggested to allow the motor end to pivot on the motor peg and reduce binding potential. Use 5/16" OD X .014 wall aluminum tubing, 3/8" long for this purpose.

Care should be taken to store the model out of light and in a reasonably constant temperature location with low humidity. The tissue covering can eventually ruin the framework with continued exposure to heat and humidity, and sunlight will deteriorate colors and strength quickly. Store the fuselage carefully as this too can develop a slight bow. At contests, always test fly first to be sure new warps haven't crept into the model and impacted your trim settings.

With care this model can be built under the minimum 40 gram weight required for the P-30 class in competition. Any modification to the airframe may impact the center of gravity relative to where the pylon is installed and could result in ballast being required during trim flights to correct stalling. If you are VERY careful it is possible to remove the pylon from the motor tube by soaking the motor tube intersection joint with acetone to soften the cellulose glue used to attach it. I only bond the pylon at the intersecting edges with the tube, but at the front and rear of the pylon the glue can squeeze up locally against the pylon floor former creating a wider bond area and is a risk for tearing a hole in the motor tube. Apply extra acetone in these areas-gently pull the pylon and apply acetone repeatedly until the glue softens and allows a clean release. You assume all risk for this process-I just offer an alternative to adjust the center of gravity by repositioning the pylon and wing in lieu of adding dead weight to correct problems.

Purchase a small digital scale to weigh your airplane and also for weighing out 10 gram motor stock if you do not already have one-this is money well spent. I also highly recommend a torque meter that operates up to 20 inch ounces be obtained as counting turns does not offer a very high degree of reliability or power consistency in practice.

I wish you the best of luck and maximum fun with your Boomer. Take care of it and it will last for years.

Clint Brooks