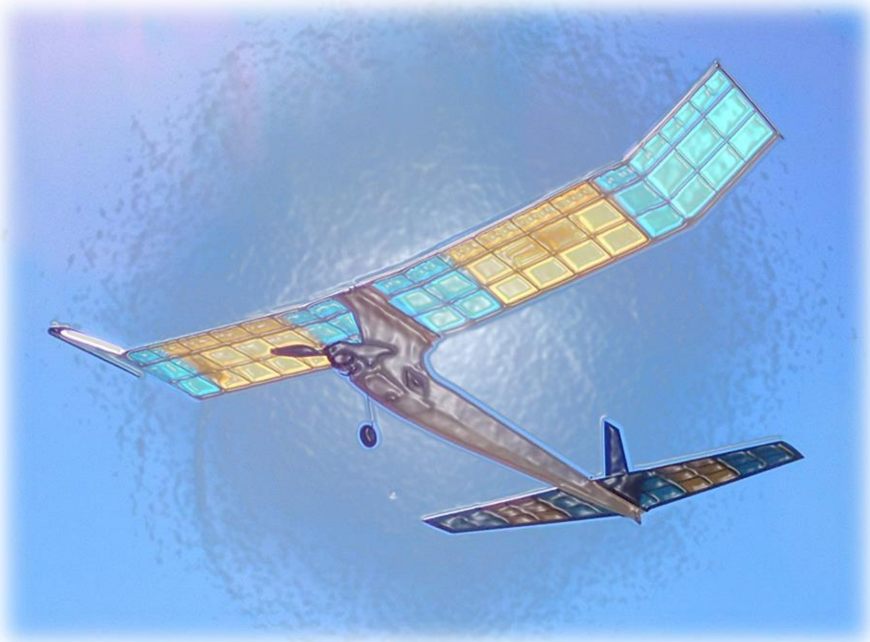

RAMROD 280

Construction Manual

Kit No. CBMD-009

CB Model Designs

www.cbmodeldesigns.com

Thank you for purchasing this Ramrod 280 eNostalgia kit. I have designed, test flown and developed what I believe is a well thought out electric conversion of the classic Ramrod designed by Ron St. Jean from around 1955. This model is not derived from any previous kit of the Ramrod as manufactured by Berkeley, Sig or anyone else to my knowledge. My data source for the model is a drawing made by Mr. St. Jean for John Pond Plans Service, now discontinued. There is no release date on the drawing, only the notation that it was produced specifically for Mr. Pond's Plan Service. There appears to have been an error on this drawing with regards to the model size. It is clearly stated as "Ramrod 250" in the title block area, and this would imply a wing area of 250 square inches. The dimensions of the wing layout result in a wing area of 284 square inches flat, and 281 square inches if you consider it as a projected area. Rather than carrying the identification as a Ramrod 250 for an electric model, the name was updated to reflect the nominal projected wing area. This is important as the NFFS rules for eNos state the maximum wing area for 1/2A class contest flying is 250 square inches. It's where the distinction for engine displacement versus watts came into play in rules making and the 1/2A source drawing puts it over the line for electric 1/2A class!

There have been many variations of the Ramrod structure put out over the period it was a top competition free flight model. The Pond plan version shows the classic sliced rib construction for the wings and the formed strip stock over tail plane spars for ribs in this assembly. The wing spars were also shown as 1/8 thick balsa all the way to the wing tips. There are other versions of this design that show 1/8 balsa spars to the tip panel dihedral break, and 1/16 balsa spars for the tip panels. I have elected to utilize the 1/16 tip panel spars for this model. Other deviations from the Pond plan include the modifications needed to incorporate the power train and electronics for electric flight. I also included notching in the wing trailing edge segments to allow increased structural integrity at each rib end joint, something the original design did not feature. Aside from laser cutting and detailing a full subsystem installation this design remains true to the St. Jean design intent for materials and size.

Introduction

Many free flight modelers have built Ramrods in their careers. This model should be familiar to those who have built gas powered free flight models and my instructions may not serve much value to you as there is nothing new as far as the airframe construction. I will keep the instructions as brief as possible and try to point out things to be aware of as you proceed. My hope is gas fliers are building this model with renewed interest for an electric powered version and have made an effort to be very detailed on the electronics installation and components as I find this aspect gets the most questions from gas flyers observing me fly this model. All the components shown on the drawing are readily available from sources listed at the end of this document. I have taken the same system I use in my E-36 Joulebox and Apache models and deployed on the Ramrod. The model is bigger than E-36 designs but the system has ample power and performance to fly this model with authority.

One other piece of advice right now. If you don't own a radio dethermalizer (RDT) system and are new to electric flying, it's one of the best investments you can make. I strongly support the use of one as it will save you time and damage to your model as you go through early flight trimming steps.

Another recommendation is the use of the Texas Timers eMax electronic timer as it includes all the settings needed for the Nostalgia gas/electric rules motor run and D/T times. Order one with the RDT pigtail installed so you can deploy your RDT system. You can get everything you need to set up this model from Texas Timers if you want. If you decide to order a motor here, the Red Max C20 is the one to get as it produces plenty of power and has the added benefit of being on the heavier side for motors this size, and helps on this model which can tend toward tail heaviness if not careful. Put the extra weight to work for you and leave the ballast in your flying box.

Find the laser part legend sheets in the document package and review contents of the kit against it. Mark next to or on parts you feel need identification during the construction sequence. There are several extra W-1 and W-2 wing ribs included in case of breakage.

Wing Assembly
All the parts for the wing except the lower 1/16 square strip for the rib caps is within the laser part sheets for the wing group. I would start by sanding the taper on the trailing edges before gluing things together. Another modification to note: I have had this wing fold in the center and in the main panel, one rib bay out. Both events occurred with an RDT save at high speed, so be aware of this when you fly the model. To offer a way to mitigate this risk I have included 1/64 plywood spar doublers for the wing center section spars and the main panel, outboard past where I had experienced a failure. These are bonded to the aft side of the spars only and on my current ship I have not seen any problems with spar failure under RDT conditions. It’s your option to use them-they offer little weight penalty.

The wing drawing shows a 1/16 square balsa spacer bonded to the aft side of the leading edge stock. This is on the original design to allow the hand sliced ribs to seat against it and maintain the height dimension for the airfoil. It’s not structural in my opinion, and offers no value to flight performance. The laser cut ribs have a foot on the forward end that gives the proper height dimension when placed on top of the lower 1/16 square rib cap, in the case of W-1, against the building board surface for the W-2’s. If you want to use the 1/16 square spacer on the leading edge, reference the wing drawing noting how much of the rib foot to cut off for proper fit against the spacer.

I assemble the various panels one at a time. Position the L.E. and T.E., lay in the lower 1/16 square rib caps at the W-1 rib stations and then locate the spars. Last thing to do is drop in the W-1 and W-2 ribs.

The spars and leading edge stock have the dihedral break angles cut into them. The only part that doesn’t is the trailing edge. I like to assemble a panel, rig it for sanding the dihedral angle and mainly go after the trailing edge end with an intent to get it in line with the other three ends that make up the dihedral joint contact areas. So that means I’m adding the 1/32 plywood dihedral gussets after this sanding step. You may have a better method of building this type of wing and I would say follow your proven method if it makes more sense to you.

Sand the leading edges of each panel to shape before joining wing panels. Shape the trailing edges as well if you elected not to pre-shape them prior to building the panels. I assemble the wing panels for dihedral by making the leading edges all line up against blocking/stops to maintain this as the datum reference for the two panels being joined. You can add the plywood dihedral gussets when you join the panels-just make sure they are shimmed from the bottom by 1/16 common to the spar locations. Use 30 minute epoxy to join the wing panels and bond the plywood gussets in place. I use light spring clamps to maintain pressure on the joint between the plywood gusset and the spars during the glue cure-this has to be a nice thin bond line and fit to take the bending load so make sure you do this right. I leave the lower 1/16 rib cap for the dihedral joint off until the epoxy has cured and I can clean up the area for any epoxy squeeze out that occurred.

Assuming you have removed the bonded panel and cleaned up the plywood gusset areas, replace the panel on the building board to finish the dihedral break rib installation. Note the 1/16 square fillers on top of the lower 1/16 square cap at the dihedral joints. They are important to keep the cap from bowing under the covering tension which is able to cause bending pressure due to the dihedral angle. You won't have this issue anywhere on the flat areas of the wing panels generally speaking. After the fillers are installed, drop in the W-1 rib to complete the dihedral rib section.

Finish sand your completed wing structure to remove all little bumps from the laser tabs, etc. Leave the tip plates off until after covering. Don't shrink the covering until the tip plates are installed to obtain best fit.

Note the wing wash-out and wash-in suggestions on the drawing. You can easily add these warps using a heat sealing iron if you covered with Polyspan or other plastic or polyester material. This model requires the wash-in on the right main panel to perform correctly. You can add or remove wash-out on the tip panels once you see how the model is reacting during the climb phase trimming sessions. You might want to add a little more wash-out on the left tip and a little less on the right depending on how the model behaves-it's a fine tuning method once the model has been flown enough to understand what needs to be done to obtain the best climb pattern possible.

Horizontal stabilizer assembly

The stabilizer uses the method of bending strip stock over the spars to form an airfoil section. The drawing shows the symmetrical entry on the airfoil that some claim is an important feature for the glide transition on the Ramrod design. I have flown with and without this entry and cannot advise if it makes a difference or not-I was always able to get a great glide transition in either case. Builders choice if you want to take the time and shim the front edge of the caps to create the entry. In truth, the entry only exists in the area of the ribs-the covering will assume a flat tangency to the structure between the ribs so not a whole lot of effect due to the covering distortion.

I have provided tip fillers in the kit to allow a solid tip block you can sand to the airfoil section. The Pond plan shows a 1/8 sheet tip against the bottom surface for this filler, and the covering would be stretched down to this to close-out. It's lighter but I hate covering a little tip transition area so the full depth filler is included. If you want, just use half of the tip filler and you will be like the original for the tip configuration.

I have added some fillers on the bottom of the stabilizer to allow key installation and also some stability against the stab platform, particularly at the leading edge area where there is very little contact. I key at the main spar filler location and on the trailing edge after covering. It's important to get the stabilizer rigged accurately as the fin position is directly related to it. I have found it easier to trim the model by having a method of allowing the aft end of the stabilizer assembly to be adjusted a bit to the left or right, while the keys hold it against the platform at the main spar location. This allows a bit of pivot to help get the fin in the right place during trimming sessions. I have had as much as 3/32 offset to the left on the fin trailing edge to tame a climb pattern, so be open to this type of adjustment to get the model to fly correctly.

Vertical stabilizer assembly

Assemble the fin from the two laser parts-cellulose cement is best for this as it sands easily and leaves no raised seam that could affect flight trim. Lightly sand joints flush. Sand the leading edge to a full radius, the rest of the fin remains flat and the trailing edge left square. Seal with two coats of 50% thinned nitrate dope or wipe-on polyurethane, sanded between coats to seal the wood grain from moisture.

Cover the stabilizer prior to installation of the fin, D/T band post and the wire loop at the trailing edge for stab hold-down.

Motor mount assembly
I have designed the eNos version of this model as if a Cox .049 Thermal Hopper engine was installed, as specified on the Pond plan. This engine has rear induction and was typically mounted using standoffs or a "birdcage" mount which was an aluminum space frame that mounted to the firewall and allowed clearance for the venturi and needle valve on the back of the engine crankcase. I have superimposed this installation on the kit drawing to give you an idea of where this engine and prop were set. I have duplicated this with a torque box assembly to allow the Cobra 2203/28 motor to mount in the same location. My first Ramrod eNos prototype had the motor mounted directly to the firewall. The resulting tail heavy model required the pylon and wing to shift aft approximately 1 ½ inches to avoid adding nose weight. With the torque box assembly, the wing and pylon can be installed as shown on the drawing, and provided you set the model up as shown for the battery location, etc., the model will fly with no nose ballast required. I will admonish you to keep the tail construction as light as you can however-there are no guarantees.

Assemble the torque box using 30 minute epoxy. Dry fit first to understand the concept and validate part orientations. Make sure it is nice and square during the glue cure process. Add the 1/16 spacer MM-5 for the landing gear leg. The 1/16 diameter strut wire is what is called out on the Pond plan, and in use it gets bent all the time on D/T landings. It's usually minor and you can easily bend it forward again for the next flight. If you wanted to use heavier gauge wire it's probably not a bad idea and the extra weight won't hurt in terms of managing the center of gravity for the model. Some suggested sizes are .067, .071 and .075 diameter. If searching on the internet try McMaster-Carr Supply, 1080 spring steel wire. They sell straight segments in one foot lengths.

The front end of the torque box features a set-up I've developed and use on my E-36 designs. It utilizes a centering ball captured by opposing countersinks in the plywood parts, and three tensioning screws. You can tighten and loosen the screws to swivel the motor about the ball center, and replaces the need to add a shim or washers under the motor mount to adjust the thrust angle. This work fine with electric power as there is no vibration to cause things to loosen up. The trick is not to overtighten the screws-just tighten down until the wobble is taken out of the swiveling side of the mount. Overtightening merely bends the lugs back and reduces the amount of gap left for angular adjustment. The model does not require any additional down thrust, but 3-4 degrees of left thrust will need to be added to start. If you don't want to use the swivel adjustment feature you can attach MM-1 to MM-2 using the three machine screws and hard shim or pack washers in the usual method to adjust the thrust angle. Use the machine screws to thread into the MM-2/-3 assembly. For either case, remove the screws and apply thin CA to the holes to harden the threads cut in the wood by the screw. Be careful not to overtighten as the wood to metal interface is not the best for a running fit on the screws. It's for adjustment, then left alone once set.
You can always shim the torque box at the F-1 interface for thrust angle, but be careful as the torque box length will allow large angular movement for very little shim and probably more sensitive to adjust this way.

Fuselage assembly

Assemble the fuselage upper and side skins first. Use the top edge of the side skins as the datum and assemble the scarf splice joints with both top edges against blocking or straightedge. Add the 1/64 plywood doublers at the front end-these are parts FD-1A, -1B and -1C. Make sure you build the left and right side skins with the doublers on the inside surface. **Note**: the FD-1A doubler needs to be set back 1/16 from the upper edge of the side skins to allow the upper skin FT-1 assembly to fit flush with the top edge. If you failed to allow for the skin thickness gap, make sure you relieve FT-1 in the area of the doubler to allow for the plywood thickness and proper fit to the side skin.

Make the former assemblies F-2, -3 and -4 with the stiffening cross members as shown. On the inside surface of the FT-1 skin, add 1/32 sheet cross grain doublers in the area of the formers F-1, -2, -3 and -4. This helps prevent splitting of the upper skin along the pylon interface as well as helping the formers beneath from splitting. The pylon height with the wing mass generates considerable force into the fuselage structure during D/T landings and these doublers are an effective way to prevent structural damage with time.

Build the fuselage upside down on the plan with a piece of parchment paper covering the fuselage top view. There are line extensions on either side of the fuselage profile to indicate the locations of the fuselage formers. I start with the FT-1 skin upside down and aligned to the drawing outline. I then position the left side skin against the FT-1 and use blocking to hold it in place against the edge of FT-1, making sure it fits in the area of the FD-1A as noted above-don't glue anything yet.

Start placing the F-2, -3 and -4 formers in place one at a time. If you haven't already done so it may be useful to add pencil lines across the inside surface of FT-1 at the former locations based on the extension lines on the drawing. Align a former to the pencil lines, and using a small square or similar tool, align for vertical position, making sure it is against the side skin held in place to give inboard and outboard location to the former. If you are confident the side skin is accurately in position go ahead and tack glue the former edge to the FT-1 skin and the side skin. Hold off on gluing the seam between the side skin and upper skin for now, until all the formers are in position, but keep the side skin tight against the upper one in case glue seeps into the seam while gluing in the formers-it should be aligned accurately in anticipation of this occurrence.

Position the right side skin in place against the subassembly started, taking care to get it aligned front to rear. Hold it against the edge of FT-1 and the installed formers. Examine everything for correct position and begin gluing the former edges to the right side skin and also in the seam area between the top and side skins. It may be hard to get CA neatly into the tail cone area so remove the assembly from the board, turn over and carefully bond the seam from the outside-don't let it twist-keep the lower edges in place against the building board with a weight on top of the fuselage to hold it down while you glue the seams.

I add the plywood F-1 firewall after the basic box assembly is glued-up. Bevel the top and bottom edges to account for the 10 degree down thrust angle built into the fuselage. Add the #2-56 blind nuts at the mounting hole locations and dry fit the firewall into the fuselage box. When satisfied with the fit, use 30 minute epoxy to bond the firewall in place to close out the former installations. All of this should be done with the fuselage upside down on the building board with weights to maintain flatness and keep twist out of the fuselage during assembly.

Bevel the 1/16 x 1/8 basswood battery tray ledge and fit against the lower aft side of F-1. This should be set flush to the edge of F-1 for proper fit to the battery tray assembly. Install the 3/16 basswood cube in former F-2 to accept the battery tray retention screw-do no drill any hole yet. Glue the 1/64 ply lower skin FB-1 by aligning the forward edge to the front edge of F-1. Align carefully to the sides to keep things centered. There are two strips of scrap 1/64 ply, 5/32 wide that get bonded to the inside surface of the FB-1 skin; install these now. These strips run from F-1 to F-2, and one edge is against the side skin. The remaining edge overhang forms a land area that the battery tray skin seats against for stability when installed.

Add all the 1/32 thick lower fuselage sheeting, grain running cross-wise. Keep the fuselage flat and weighted down as you install the balsa lower skin. Sheet all the way the end of the tail cone-the last portion from former F-7 aft is easier to install with the grain running length-wise.

Congratulations-you should now have a twist free and square box fuselage. Hopefully you maintained good control for the plan view shape and there is no banana shape to the length of the fuselage either.

Construct the battery tray per the drawing. Fit into the battery bay opening, testing for fit with the basswood ledge. You may have to carefully sand a little bit off the underside of tab end on the battery tray to get a snug fit with the ledge, which keeps the front end of the tray from dropping down out with the battery installed. There is a designed-in gap at the aft edge of the tray to the skin opening so the tray can slide aft far enough to clear the ledge, allowing the tray to drop down and out for battery installation and removal. You can also sand the end of the fork tab off to allow the tray to angle down more for removal-leave enough for the screw to capture when installed.

With the tray installed in the fuselage using masking tape, create a center hole in the basswood cube in F-2 using the tray slot to center a sharpened wire or drill bit to locate the center for the retaining screw to be installed. Drill a .062 diameter hole with a pin vise to carefully make a hole through the basswood cube. Use the #1-72 screw to thread the hole-remove and add thin CA to harden the threads in the wood made by the screw. This is a working hole so be careful to barely tighten the screw enough to secure the tray, or it will quickly strip with use. The length of the screw shown is required to allow the screw to be backed out to let the slotted end move enough to allow the tray front to drop down and clear the landing gear strut. You don't want to remove the screw if you can help it. It's one of the things you will probably drop in the grass right away when installing the battery and tray, so keep some spare screws handy if you think you want to remove it each time.

Assemble the pylon with the wing rail assemblies. I found the stock design with the 3/32 sheet wing platform glued to the top of the pylon completely inadequate for taking repeated D/T landings without eventually breaking off. Similarly, the original design had light wire hooks glued to the edges of the pylon front and rear for wing rubber band hold-downs. These also proved weak with the rubber tension coupled with shock loading during D/T landings and have been omitted in favor of the robust wing rail concept that increases the platform bond area as well as taking the localized stress out of the pylon for the wing band tension. This design has not shown any signs of structural weakness so far and highly recommended.

I designed the wing platform to key to the 3/16 pylon thickness to make it easier to get the platform installed on center. The key slot edges seat against the top of the wing rails so there is no weakness due to the notching. Your wing will be nicely centered atop this assembly when you are done.

Test fit the pylon into the fuselage assembly-it should fit snugly all the way to the bottom of the slots in the formers. The model has been shown to fly without nose ballast if built per plan. The upper skin does include extra length on the pylon slot in the event you would like to move the pylon aft to help with the center of gravity situation. Builders choice to do this, but wait until the model is complete enough to assess the balance point and make adjustments.

The stab platform can be installed to the fuselage as allowed by the profile of the side skins. If you built the stabilizer without the symmetrical entry shape this is the way to go. If you built the symmetrical entry into your stabilizer, you will have a much better stab platform seating condition if you match the entry of the stabilizer in the platform at the front end. This is achieved by adding 1/16 square fillers at the front end of the stab platform cutouts in the side skins. I use Duco or cellulose glue for this as it is easier to sand the fillers flush with the side skins after gluing in place. Make a balsa sanding block with the profile of the entry and carefully sand in the offset entry contour in the fillers and tangent to the existing skin edge. There is also another consideration before adding fillers or the stab platform. The model is flown right-right, so you can go ahead and build in the stab tilt for the right turn in the glide. I draw a line parallel to the stab platform mounting edge on the side skin to maintain reference to where it is. I then cut off 1/32 of the side skin edge on the left side, and take this material and glue it onto the right side skin edge. Do this before adding the fillers to support the entry contour, or adding the stab platform if not using the entry. You can lightly block sand across the top of the edges to get the edges parallel to the stab platform surface. The lines added are to measure from and assure the incidence for the stab platform is level.

This seems like a lot of work, but I find on this model packing shims for stab tilt made for a sloppy support system for the stab and allowed variability in use which is never good in free flight models. Having the stab platform conform closely to the stab surface makes a big difference on this model and you should be pleased with the results.

After preparing the stab platform mounting area, install the platform itself, taking care to keep it aligned on center. The fuselage tail cone gets very slender-check that the platform is not getting twisted forward to aft. You want an even profile from front to rear so the stabilizer mounts in one position and can’t rock from side to side. This is important for the model so take care to align things as best you can. I suggest installation using Duco or cellulose cement to allow positioning adjustments as the glue sets. If there are errors you wish to correct after, the glue can be dissolved with acetone applied with a brush and the platform removed for another try.

There is an additional installation shown on a separate drawing for a lateral adjustment mechanism to aid in getting the fin set during flight trimming efforts. It’s not part of the original design, which showed nothing for a D/T system or keying method. So, if you want to install it, now is the time to consider options and make up the parts for installation. Download the PDF file from the Ramrod web site ordering page for some illustrations of this system installed.

By now you have glued on the plywood frames for the timer and servo openings on the fuselage sides. Add the fairlead tube for the D/T lanyard, and the 3/16 square basswood turnaround post between the servo location and D/T fairlead. The stabilizer hold-down force is quite strong as the stab area is large and requires strong rubber band tension to pop it up in flight. This can result in an overload on the servo arm which will cause the servo to make noise and drain the battery as well as possibly damaging the servo pot wipers and rendering it useless. In addition, the stab trailing edge may not be held down by depending on the rubber bands to the servo arm alone. The turn around post allows tight tension from the post to the tail, and the lanyard tail end to the servo can be under much more favorable tension for the servo operation. I highly recommend using

the turnaround post or something similar to manage the D/T line tension and keep the stab trailing edge firmly down against the stab platform in flight.
The D/T fairlead at the aft end of the fuselage has proven very robust in spite of the small size and nuisance factor to construct. Leave the central basswood member long enough to hang onto for assembly of the sides and sanding, then cut it off to free the desired assembly and install on the fuselage. Make sure the wire bale is firmly glued to the sides to maintain line capture and not loose the tail when the D/T is deployed! The small bead on the lanyard makes it easier to grip the end of the D/T lanyard loop for installation to the stab hold down hook and also prevents the line from sliding back through the fairlead when detached.

Finish the model using your favorite material and methods. I have covered my wings and stabilizers with Airspan synthetic tissue covering. This is a polyester heat shrink material similar to Polyspan. It seems a bit lighter and the colors are already in the material. It has gone out of production and as time goes on it will be difficult to come by. Polyspan is another good option for a covering material as it will offer puncture resistance (better than Airspan) and is not affected by humidity. Plastic heat shrink film covering looks nice but doesn't add any stiffness to the structure it covers. It also suffers no ill effect from humidity so desirable from that standpoint. Traditional Esaki tissue adds a lot of stiffness but is the worst for puncture resistance and effects from humidity. If you fly in a dry climate you might appreciate this option as it is also the lightest. And it's easy to recover a wing or tail should it become shabby looking with use.
I normally finish the fuselage with three coats of thinned clear nitrate dope, finish sanded between coats. I leave color off to make it easier to repair in the event of damage. Covering the fuselage with tissue adds good strength if you want-some beautiful results can be had with this method.

Subsystem Installation

If you are a gas flyer trying electric power this should be the most interesting part of the instructions for you. Whereas gas power model accessories are getting harder to come by, electric power component availability is growing and improving all the time and there is a good selection from a lot of sources for brushless motors, electronic speed control (ESC), batteries, electrical connectors and servos needed to make up an electric power train and dethermalizer subsystem. The unique and harder to find items are the electronic timers intended for free flight use. This is a niche market for producers of said timers and we need to be very appreciative that people still want to design and build components like this for free flight modelers.

Rather than create a large and bulky document for this kit, I have made another document covering the subsystem elements and installation in detail for your reference. This can be downloaded from the CB Model Designs website under the Ramrod ordering page. Scroll to the bottom to find the free PDF file to download.

Flight Operations

With the model assembled install your battery pack and check for the center of gravity location as shown on the drawing. Hopefully it balances, but if it shows any tendency toward being tail heavy add nose ballast to get it balanced at the point shown. My current Ramrod weighs 7.7 ounces, ready to fly, including RDT.

Make a few hand glides to confirm the balance of the model is reasonable and that it wants to start a turn to the right. The large stabilizer on this model can mask a slight tail heavy condition for hand glides, so don't spend too much time trying to fine tune the glide-just make sure there is no obvious stalling issue or other problem that would result in problems for the first power run. Glide trim adjustments will become much more apparent once you start flying the model under power.

It is suggested the motor thrust angle be set with about 3 degrees left thrust and no down thrust to start.

Make sure your battery is fully charged. If not, the ESC may reach the cutoff voltage threshold and shut down your motor before you launch or very shortly after-you don't want that to happen.

If you are using the eMax timer, set the motor and D/T rotary switches to "0" for the first flights. This gives a 2.5 second motor run and one second D/T after the motor shuts off. On other timers, select the input that gives the shortest flight time for testing. On any motor run time, you can always hold the model after releasing the timer button for a short countdown to burn off some of the run time before launching and minimize the crash risk on initial flights.

The Ramrod was designed for a VTO launch. The 10 degrees down thrust is intended to keep the model from going on its back in a VTO launch attitude. Therefore, the best launch attitude is going to be very steeply up with a little bank to the right to keep it in the VTO context. Launching it level or slightly nose up is an invitation to a crash.

Power up and launch. The model should turn to the right and start to climb up in a right spiral until motor shutoff at which point it should roll out into a nice right glide circle. If the model starts to stall on the glide transition, it is probably tail heavy. You can reduce decalage to try kill the stall, but if this proves inadequate just add nose ballast and keep on with the program.

I've had to reduce decalage by about .012 under the stab leading edge to get the model to climb in the turn under power. This usually helps if the model persists in going into a flat climbing right turn after launch. If the model looks like it will turn right into a shallow dive, you can add some left rudder tab, increase the left thrust and also try left wing skew, one change at a time to see the effect. Make sure you put markings on the wing bottom for reference to where the wing is resting straight-two on either side of the platform at the T.E. and same at the L.E. That way if you add skew you can see how much the wing has moved. It also gives you reference in the event you need to reposition the wing after landing, etc. has moved it a bit on the platform. Once the model is trimmed for climb, key the wing where you know it is performing best for the trim pattern you have achieved.

The main changes I've seen on thrust angle adjustment have been adding left thrust or taking some out. I have not had to make any adjustment for down thrust.

Once you are comfortable with the model and it is performing consistently, try a VTO launch. It's very easy-wait for indication of lift, place the model upright with the tail touching the ground and angled slightly to the right, as viewed from behind, or looking down on the model. Push the timer to start, and release. It will fly off just like the gas powered version but with a lot less drama for getting it started and in position.

The Ramrod has a great slow glide that seems to go on forever. It's a classic and you will fall in love with it once you have it trained.
Good Luck!

Clint Brooks
7 Mar 2019

Resources

Innov8tive Designs **www.Innov8tiveDesigns.com**
Source for the Cobra 2203/28 Brushless motor, Cobra ESC's, connector pin sets, conventional prop adapter and programming card for Cobra ESC's.

Texas Timers **www.texastimers.com**
Source for eMax electronic timer, Red Max C20 Brushless motor, ESC's Thunderpower 2S 325 Mah/70C lipos, 3.5 gram servo, Graupner folding prop blades and custom aluminum prop hub. You can obtain a complete airborne subsystem from Texas Timers, ready to install if you ask for it. Battery charger also available here, as well as the new Texas Timers RDT system.

Starlink-Flitetech Models **www.starlink-flitetech.com**
Source for Starlink electronic timer. Order with NOS chip to fly the Ramrod with it. Also sells a complete E-36 electronics and powertrain package that requires soldering to complete, and will work in this model. Order it with the RDT timer version with NOS chip, and see if you can substitute a Cobra 2203/28 for the stock AX1806 motor their kit normally includes. They do not sell batteries as part of the electronics package. They do handle the Aeris RDT system.

Thunderpower R/C **www.thunderpowerrc.com**
Source for high discharge rate lipo batteries. Current high discharge series is designated Rampage. Also sells chargers and other accessories.

FAI Model Supply **www.faimodelsupply.com**
Source for Airspan covering material (while it lasts), Polyspan and other covering types suitable for this model. Plus, a host of tools and supplies for free flight models.