

GYM-E

Original Design by Todd Long



Instruction Manual - Version 1.03



Span 31 in. / Length 27 in. / Area 265 Sq. In. / Weight 4.5-6.5 oz.
Gym-E kit reproduced with permission by Stevens AeroModel

WARRANTY

Stevens AeroModel guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. In no case shall Stevens AeroModel's liability exceed the original cost of the purchased kit. Stevens AeroModel reserves the right to change or modify this warranty without notice.

In that Stevens AeroModel has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.

If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return this kit immediately in new and unused condition to the place of purchase.

REQUIRED TO COMPLETE KIT:

Kit Contents:

- Rolled computer drawn Plan Sheets
- Illustrated Instruction Manual
- Laser Cut Parts Inventory (on next page)
- 1 – 5mm x 19-5/8" Carbon Tube
- 1 – 1/32" ID x 18" length push rod housing
- 2 – 1/4" x 18" length balsa dowel
- 2 – 5/16" x 18" length balsa dowel
- 2 – 1/32" x 18" length music wire
- 1 – 1/16" x 18" length music wire (heavy gauge landing gear)
- 1 – 0.047" x 18" length music wire (optional lighter landing gear)
- Hardware Bag
 - 2 – DuBro RC Micro EZ-Link (DUB849)
 - 2 – DuBro RC Micro Control Horns (DUB848)
 - 2 – DuBro RC Mini E/Z Connector (DUB845)
 - 2 – 1.5" Spindle Wheel (GW/WH01/38)
 - 1 – Package Gum Rubber Bands #16 (GW/AP012)
 - 1 – 1/8" x 3" Length Hardwood Dowel
 - 1 – 1/16" Laser Cut brushless motor mount

Recommended Finishing Items:

1. 1 Roll of Stevens AeroModel AeroLITE low temp light weight covering film.
2. 1 Roll Clear Tape (MMM190)

Required Electronics:

1. 2 – Sub Micro Servos (Designed for: JR S-185, JR SM8, or HS-50)
2. 1 – Micro Receiver (Berg MS4L)

Power System:

1. 1 – GWS IPS "A" Gear Drive (GW/IPS-DX2BB-AXCS)
2. 1 – EHS-50 Heatsink (optional)
3. 1 – 2-5A Electronic Speed Control (Castle Creations Pixie 7P)
4. 1 – 250mAh (6c) 7.4V LiPo (Stevens AeroModel OEM250)
5. 1 – 10x4.7 Slow-Fly Propeller (GW/EP1047)

Notes on brushless power systems. Having flown this delightful model on the affordable brushed power system recommended above we cannot see where the model or hobbyist would benefit from brushless power. In fact, if the wrong brushless system is installed in this model there is a serious chance of over speeding and damaging the airframe. Should you still elect to install a brushless power system be mindful of obtaining a motor, battery, esc combination that exactly replaces the weight of the original brushed system above (about 52-54g) swings a propeller with a diameter in the range of 7-10 inches and does not produce a pitch speed greater than 25mph.

Items You Will Need:

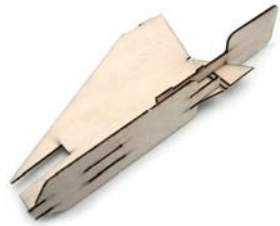
1. Thin CA (super glue)
2. Medium CA (super glue)
3. #11 and Straight Edge Razor Blade(s)
4. T-Pins
5. Fine Grit Sand Paper and Sanding Block

Fuselage Assembly

The bulk of the fuselage is assembled from 1/32" plywood. We have intentionally made the fit a bit loose as the parts are somewhat delicate until the assembly is complete. Thus we suggest using a medium weight CA glue to bond the fuselage parts of the Gym-E. NHP Flash Medium or Mercury 100XF CA glues work very well here. All parts are 1/32" ply unless otherwise stated and interlock at right angles. Prior to bonding check/align parts for perpendicular fit.



1. Begin "Forward Wing Mount". Locate the 1/32" ply parts M1 (only one required for this step) and M4. Key parts as illustrated on left then bond with CA glue.



2. Locate the M10 battery tray and key to previous assembly as illustrated below then bond with CA glue.



3. Locate the second M1 component and key to assembly as illustrated then bond with CA glue.



4. Locate one of the M9 landing gear supports and key to the assembly in the forward most slot provided in the wing mount. Retain M9 with CA glue. **DO NOT INSTALL THE SECOND M9 COMPONENT TO THE AFT SLOT AT THIS TIME.**



5. Locate M5 and key to top of wing assembly as illustrated. Square assembly then bond M5 with CA glue.
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6. Assemble IPS motor mount stick from a lamination of 1/32" ply and 1/16" balsa parts as illustrated. Laminate in the following order: M2, M3, M3, M2 to create the motor mount stick. Next, install the completed stick to the Forward Wing Mount centering the stick to the mount as illustrated.



7. Begin "Rear Wing Mount" and servo tray. Key parts M6 (only one required) and M7 together as illustrated. Bond with CA glue.



8. Locate the S1 servo tray and key to assembly. Note pay particular attention to the drawing on the plan sheet and the photo to left properly position S1 servo tray so that it extends forward of the Rear Wing Mount. Bond S1 with CA glue.



9. Locate the second M6 component and key/bond to assembly as illustrated.

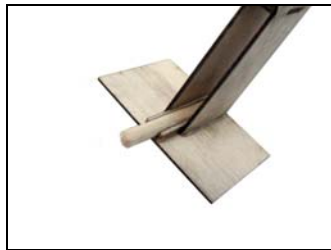


10. Bond M8 to top of assembly as illustrated.



11. Locate the 3/32" balsa parts marked A1 and A2 (these parts resemble an elongated "C") and install within the wing mounts to the underside of M5 and M8 respectively. **Study the plan set for proper orientation of these parts.** The pocket formed by the "C" cut-out will capture the wing mounting dowels thus, it is important that the "C" shape opening in A1 faces towards the motor mount stick when installed within the Forward Wing Mount. Conversely the opening in A2 should face opposite the servo tray, or towards the rear of the model, when installed within the Rear Wing Mount.

Example photos on the left details A2 and installation in Rear Wing Mount.



12. Cut the provided 1/8" hardwood dowel stock to the following lengths to form the front and rear wing mounting dowels:

Front - cut to 7/8"
Rear - cut to 1-1/8"

Sand round one end of each of the wing mounting dowels. Then, install the short and long dowels to the front and rear, respectively, wing mounts.

(The top photo at left shows the dowel being seated and bonded within the Rear Wing Mount assembly. The bottom photo at left shows the dowel installed within the Forward Wing Mount.)



This completes the Forward and Rear Wing Mount assemblies. You should now have two assemblies that look identical to the illustration on Left.



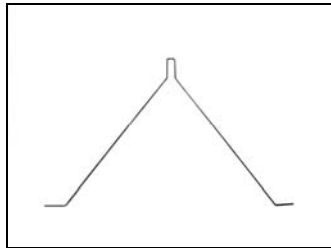
13. Slide both the Forward and Rear Wing Mount assemblies on to the pre-cut 5mm carbon tube. **THERE IS NO FORWARD STOP** where the carbon tube installs within the Forward Wing Mount, instead, align the leading edge of the carbon tube with the leading edge of M4 within the Forward Wing Mount. With the Forward Wing Mount properly positioned adjust the position of the rear wing mount so that the distance measured from the leading edge of M5 and trailing edge of M8 are exactly 9-1/4" apart. Finally, set the assembly inverted on top of your flat work surface to align the wing mounts and bond to the carbon tube at all contact points with Thin or Medium CA glue.



14. With the fuselage still inverted on your work table bond the part S2 to the center of the servo tray as illustrated on Left. S2 sets the thickness of the servo bracket and only one S2 part should be required if you intend on running the suggested servos. For compatibility with servos featuring thicker mounting tabs we have provided an additional S2 part which may accommodate various un-supported servos on the market.

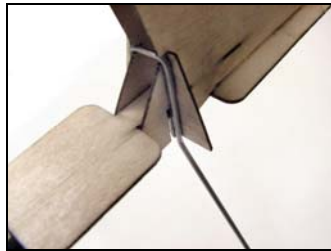


15. Complete the servo tray by bonding S3 on top of S2 and centered/aligned with the cut-outs in S1.



16. Use the plan set as a guide and bend the provided 1/16" music wire to match. Note that we have included a length of .047" music wire which you may substitute for reduced weight at the expense of reduced ground handling.

With the wire landing gear properly bend slide over the aft section of the Forward Wing Mount in-front-of the receiver tray. The landing gear should seat flush against the previously installed M9.



Now install the second M9 component from the bottom up. Bond to assembly with CA glue.

Finally, wick CA glue along landing gear wire within M9 parts to retain gear.



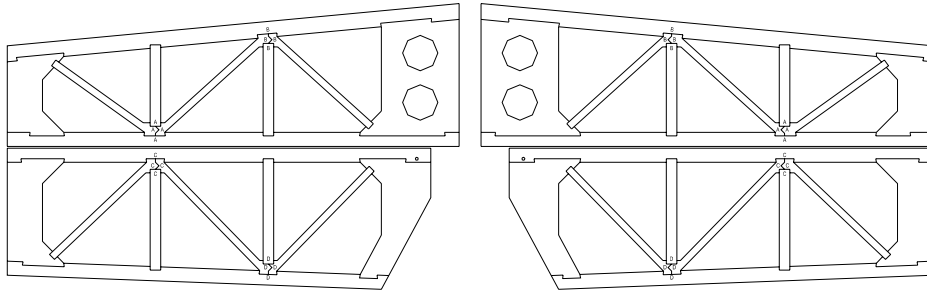
17. Slide included spindle wheels over landing gear axel then bend / cut excess wire as illustrated to retain wheel.

Note that hub of spindle wheel must be drilled to fit 1/16" music wire landing gear. No drilling will be required for lighter .047" music wire gear.

V-Tail Assembly

Use the plan sheet as a guide to reference parts layout for V-Tail assembly. The design of the V-Tail assembly utilizes the Stevens AeroModel TrusLoc™ interlocking balsa truss. All V-Tail components are located on the 3/32" balsa sheet labeled GYME-SA 02/04.

1. Begin by assembling the outside frame for the control surface. Next, fill in with the interlocking truss components. Note that the truss components are etched "A", "B", etc. the methodology we use for assembly is "A" to "A" and "B" to "B" etc. As there is always a slight angular component to parts cut with a laser we suggest that, when possible, you invert one of the interlocking parts for a more positive fit (one part etched side up – interlocking part etched side down).



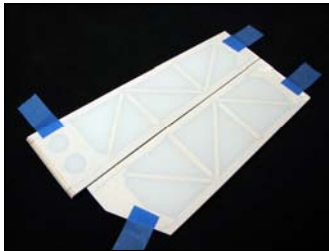
2. Bevel the leading edge of the elevators at 45 degrees, relative to your building board, in preparation for tape hinges. Note: When sanding in your bevel MAKE A RIGHT AND LEFT ELEVATOR.

Illustration shows properly sanded LEFT side elevator. Note that top surface of elevator should be flat with bevel tapering aft.

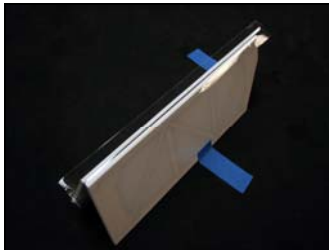


3. Cover both the stabilizer and the elevator. Remove 1/4" of covering from the inside edge of both the right and left stabilizer. Next use the provided stabilizer jigs to set the angle of the stabilizer relative to your flat building board. Next block sand the inside edge of the stabilizers so that when held together at the 110 degree angle the root surfaces fit flush.

Illustration shows completed Right stabilizer.



4. Temporarily tape the completed stabilizer and elevator to your flat work surface, setting the gap between the parts to 1/32". Note that flat side of elevator should be on top with beveled side of surface facing building board. Now, apply a length of clear tape along the joint of stabilizer and elevator. Remove / trim excess tape to edge of assembly to complete top side of tape hinge.



5. Release from work surface, fold the hinged surfaces back on each other until the beveled surface of elevator is flush with perpendicular inside edge of stabilizer. Now apply tape along joint and trim. This completes the underside of the tape hinge.

This completes the V-Tail assembly. See "Final Assembly" for further instruction.

Wing Assembly

The wing is of conventional build. To complete this assembly you'll need a building board, T-Pins, plan sheet, and plan protector. We will use medium CA throughout the build. Drop ceiling tiles are readily sourced at most DIY home centers and make excellent building boards. Plans protection is easily accomplished by using the poly tubing that this kit shipped in, cut the sealed end of the tube off then make a cut down it's length and flatten out for a very CA resilient plan protector.

Set your building board atop your flat work surface, tape the provided plan set on top of the building board, cover plan set with your poly tubing plan protector. T-Pins at the ready? Let's get started!

1. Start the wing by laminating a few ribs. Take two R4 ribs and laminate them together. Repeat once more so you have two sets of two R4 ribs glued together. Take two R1 ribs and laminate them together. Repeat once more so you have two sets of two R1 ribs glued together. Set laminated ribs aside.



2. Build the center section first by cutting the 5/16" balsa dowel leading edge to length and pinning to the plans. Take the remaining six R1 ribs, position and glue them in place making sure they are pinned flat to the building board. **MAKE SURE THE RIBS ARE PLACED IN THE CORRECT ORIENTATION WITH THE HIGH POINT TOWARDS THE DOWEL, SEE PLANS.** Cut to length and glue the 1/4" balsa dowel to the rear of the ribs.



3. Assemble the 1/16" R4 wing center section sheeting from R5a, R5b, and R5c. Glue the 1/16th R5 sheeting in place spanning center R1 ribs as detailed on the plan set. Let glue cure, and then remove the center wing section.
4. Now build the left and right outer wing panels using ribs R2, R3, and the laminated R4 ribs in similar fashion to the center section. Raise the outer wing panel using the provided leading and trailing edge jigs then sand in the correct dihedral angle at the leading and trailing edge dowels at outer wing panel root. It is very important to get the correct angle sanded so there is a perfect fit with no gaps between the center wing section and outer wing panels. See the picture above to see the easiest way to do this.



5. Pin the center section down and glue the outer wing panels (one at a time) to the center section supporting each tip using the provided leading and trailing edge jigs. Glue the laminated R1 ribs in place over the joint where the outer wing panel and center section come together (laminated R1 should be oriented parallel to joint). Sand any rough spots on the wing in preparation for covering.

Final Assembly

1. Complete the wing by covering with AeroLITE™ by Stevens AeroModel according to the instructions provided by the covering manufacturer. Only the top surface of the wing needs to be covered. Note: Be careful not to warp the wing by shrinking the covering material too tight. We find it easier to cover the wingtips first then the center section.
2. Attach the wing to the fuselage with two (2) #16 rubber bands to and use as a guide make square the V-Tail stabilizer to the fuselage and wing. Secure the V-Tail stabilizer using medium CA glue.
3. Cut the provided 1/32" id plastic push rod housing into 9" lengths and tape them to the carbon boom as illustrated on the plan sheet. Install the DUB845 Mini E/Z Connectors on the outer holes on your servos. Slide the JR S185 servos within the servo tray and retain by looping a rubber band around the servo body and tray at the servo mounting tabs. Cut the provided 1/32" music wire to length and form into pushrods using the plan sheet as a guide. Slide the completed push rods through the tubes from the rear (with the "L" bend at rear of fuselage) then through the DUB845 Mini E/Z connectors on the servos. Remove a little of the covering around the holes where the DUB848 Micro control horns will attach. Attach the pushrods to the control horns with the DUB849 Micro E/Z Link. Now mount the control horn into the elevator halves and glue them in place so they follow the natural contour of the pushrod. Once the glue has setup for retaining the control horn, clip the excess post from the back side of the control horn.



4. Mount the motor and ESC. If the motor fit is loose then build up a thin layer of CA glue on the motor stick, allow glue to cure, then re-fit motor to stick (repeat until motor is a snug fit). Place a piece of Velcro under the M10 battery holder (not provided). The Velcro comes with adhesive but we still like to glue it on with a little CA. Attach the opposite piece of Velcro to the LiPo battery and place the battery onto the battery mount.
5. Mount the receiver under behind the Forward Wing Mount on the tray provided and run the antenna to the rear of the plane (For 72MHz systems we suggest the use of an Azarr M72-I base loaded antenna). Now mount the wing to the fuselage. Make sure everything the plane needs to fly is now mounted and installed. The plane should balance between 3" and 3 1/2" behind the leading edge. CG changes can easily be made by shifting electronics or using a small amount of modeling clay in either the nose or tail.
6. Make sure both the servos and elevators are electronically centered in your radio programming. Now, center the control surfaces at the V-Tail. Next, cut the remaining pushrod wire so they extend about 3/8" beyond the connectors. Finally, snug the set screw on the DUB845 Mini E/Z Connectors.
7. Follow the manufacturer's instructions for the transmitter and set it up for elevon mixing. When you pull back on the stick both elevators should move up, opposite when you push on the stick. When right stick is applied both elevators should move to the right when behind the model, opposite for left stick. If you do not get this movement then make adjustment at your transmitter or swap the servo connectors at the receiver. When up elevator is applied you should have about 1/2" to 3/4" inches of travel.
8. Set up the ESC according to you manufacturer's instructions, check the CG again, charge the battery and go fly.