Build Instructions

scimon 30

2014 Science Olympiad Legal - *Elastic Launch Glider*
This kit builds two gliders.

Wing Span: 11.02 inches | **Wing Area:** 30.0 square inches | **Average Flying Weight:** 6 grams
Build Instructions - *Version 2.0 (revised 09.30.2014)*

Build It!™
stevensaero.com
Manufactured with Pride Colorado, U.S.A.

Build Instructions

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. Further, Stevens AeroModel reserves the right to change or modify this warranty without notice.

LIABILITY RELEASE

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 use by the user. 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.

THIS PRODUCT IS NOT INTENDED FOR CHILDREN 12 YEARS OF AGE OR YOUNGER.

WARNING: This product may contain chemicals known to the State of California to cause cancer and or birth defects or other reproductive harm.

PRODUCT SUPPORT

This product has been engineered to function properly and perform as advertised, with the suggested power system and supporting electronics as outlined within this product manual. Product support cannot be provided, nor can Stevens AeroModel assist in determining the suitability or use of electronics, hardware, or power systems not explicitly recommended by Stevens AeroModel.

For product assembly support, replacement parts, hardware, and electronics to complete this model, please contact Stevens AeroModel at www.stevensaero.com.

Stevens AeroModel
26405 Judge Orr Rd. Colorado Springs, CO 80808 USA
719-387-4187 www.stevensaero.com

Build Instructions

scimon 30 - Kit Inventory

Kit Contents

- ☐ Illustrated build instruction manual
- ☐ Plan set, 1 sheet, 11 in. x 17 in.
- ☐ Laser-cut wood, 4 sheets, makes 2 gliders

Hardware bag

- ☐ 1 Aluminum alignment pin, 1/16 in. diameter x 1/4 in. length
- ☐ 1 Hardwood dowel, 1/4 in. diameter x 4 3/4 in. length
- ☐ 1 Contest grade, elastic rubber strip, 1/8 in. width x 24 in. length
- ☐ Modeling clay, ballast, 12 grams

Introduction

The scimon 30 Catapult Launch Glider was inspired by the elegant “Simple Simon” glider designed by K. Krempetz. Using modern design and construction techniques developed by Stevens AeroModel, and design input from champion free-flight experts, Mark Covington and Don DeLoach, this kit is an excellent introduction to the basic principals of model construction and flight.

The scimon 30 Catapult Launch Glider was designed to be a legal contestant in its class, at all Science Olympiad events (contest rules established 2013). If built according to the instructions it will fly very well and meet all of it’s design parameters. The scimon was designed to teach the basic principals of flight. The basics of airplane design and model construction, as well as the effect of control surfaces on the flight envelope of an airframe. Not only is this kit instructional, it is also very satisfying to build, and a lot of fun to fly.

Our new version 2 scimon 30 has been updated to feature our innovative wing tip dihedral jig system that greatly simplifies the build process and consistency of the final assembly. The V2 scimon 30 is 2014 Science Olympiad rules legal with a maximum wing span of 28 cm.

Note: The scimon is designed for both ***right-handed*** (RH) and ***left-handed*** (LH) pilots. As such there are a few differences in construction that will be called out in the build sequence.

Build Instructions

Required Tools and Supplies

Flat work surface - Table top or building board, make sure the building surface is warp free
Glue - Medium Cyanoacrylate CA (super glue)* or Aliphatic Resin (wood glue)*

**Cyanoacrylate Glue (CA) also known as super glue, is a quick setting glue that bonds in seconds. Please use caution with this type of glue. If this is the first time using CA, we recommended that you keep finger tips away from glue joints while assembling the model, CA can bond skin instantly. The use of a precision glue tip provides the most control of glue application. When using CA to assemble this model tack glue assemblies first, after the parts are joined revisit all joints with a second application of glue. CA glue and glue tips are available from stevensaero.com. Follow all manufacturers instructions for use.*

**Aliphatic Resin also known as wood glue under the brand names, Titebond or Elmer's etc., are also a good choice. This type of glue takes much longer to cure. We recommend pining the parts together after assembly, allow ample time for the glue to setup. Aliphatic resin is not an instant glue so be prepared to take some time with the assembly of the model. Follow all manufacturers instructions for use.*

Optional Tools and Supplies

Our scimon model, as delivered, can be assembled entirely without the aid of hobby knifes, pins, or abrasives, making it ideal for use in instructional environments. As such the following items are, in-fact, optional and suited for progressing builders, craftsman, and serious competitors.

Hobby knife - X-acto^{R} or Excel style hobby knife with supply of #11 blades
Sanding block - Loaded with 250 - 400 grit sand paper (sanding blocks are available at stevensaero.com)
Straight pins - Secure parts to building board and each other while glue dries
Masking tape - Low-tack blue painters' tape
Building board - Soft flat work surface that will accept straight pins (balsa building boards are available at your local hobby shop, or make one using a piece of drop ceiling tile).
Drill bit, 1/16 in. - Use as an alignment fixture, if aluminum alignment pin is lost
Hobby clamp or clothes pins - Used to hold parts together while glue dries
Clear lacquer - Protects the finished model from moisture without adding significantly to the models final flying weight. Use only one light coat. We recommend DEFT brand clear-lacquer in a spray can, available at most hardware or home improvement stores.
Design Master Color Tool - If desired add a little color to the model. Use color sparingly, i.e., on a wing tip or the tail planes. Paint adds weight and can effect the performance of the finished model, available at most arts and crafts stores.

Build Instructions

General Assembly Instructions

Thank you for purchasing **The scimon 30 Catapult Launch Glider** from Stevens AeroModel. This model has been developed and manufactured using state-of-the-art CAD/CAM systems. Our kits feature a unique interlocking construction process, that when compared to traditional building methods, saves countless hours of measuring, cutting, sanding, and fitting. Also included in this kit are building fixtures which will aid in assembly, their construction and use will be described in the step by step build instructions. We are certain that you'll find our kits to offer a truly exceptional build experience.

As this kit is recommended for the novice model builder and pilot, we invite beginners who have purchased this kit to seek the help of an experienced builder and pilot. If at any time during the assembly of this kit, should you run across a term or technique that is foreign to you, please do not hesitate to contact our staff with your questions.

IMPORTANT!
Please **READ** and **REREAD** these build instructions along with any other included documentation before starting your build and/or contacting our staff for builder support.

Pre-Sanding (Optional)
Before removing any parts from the laser-cut sheet wood, use a sanding block loaded with 250 - 400 grit sandpaper and lightly sand the back side of each wood sheet. This step removes any residue produced as a result of the laser cutting process. This step also slightly reduces the thickness of each sheet of wood. We have found that most stock wood sizes run several thousandths of an inch oversized. Leave all parts in the sheet wood until required for assembly.

Protecting Your Work Surface
Use the poly tube that this kit was packed in to protect your work surface from the glues used during assembly of the model.

Bonding the Assembly
This product's tabs and notches interlock like a 3D puzzle. We strongly suggest that when fitting parts, you dry fit (use no glue) the parts together first. It is advised to work 1 - 2 steps ahead in the instructions, using this dry-fit technique. This allows the opportunity to inspect the fit and location of assembled components, and shows the benefits of our construction technique. Once you arrive at the end of a major assembly sequence, square your work on a flat work surface or by using the included assembly fixtures and bond the dry fit joints with glue. Using the dry-fit process, you'll be able to recover from a minor build mistake and will ultimately end up with a square and true assembly.

When using CA, apply glue with a fine-tip CA glue applicator. Unless otherwise noted in the instructions, we find it easier to "tack glue" parts (temporarily bonding parts in assemblies, using a small dot of glue).

When using wood glue, apply a small amount of glue to the surfaces to be bonded. After assembly, pin your parts into place and allow them to dry throughly.

Sanding
Do not sand the individual parts of this model. This kit is precision cut to assemble with the correct angles and incidences to ensure proper flight performance. If desired the laser burn may be removed after assembly.

Never Force the Fit!
This is a precision laser-cut kit. Our lasers cut to within 5 thousandths of an inch in accuracy. Yet the wood stock supplied to us by the mill may vary in thickness by up to 20 thousandths. This variance in the wood stock may cause some tabs and notches to fit very tightly. With this in mind, consider lightly sanding or lightly pinching a tight-fitting tab, rather than forcing the parts together. You will break fewer parts in assembly, and end up with a square and true airframe.

Build Instructions

Assembly

Wing Assembly. The center wing section builds using an integrated jig assembly developed by Stevens AeroModel. This build method ensures consistency in build and greatly simplifies the assembly process. When removing the W1 wing center section from the parts sheet, be careful not to remove the "frame" that encompasses the right left and trailing edge of the wing center section. Wing parts are designated with the letter "W" followed by a number. Parts have been numbered sequentially. The wing build order includes parts W1, W2, and W3.

☐ 1. Locate the wing parts (sheet 02/04, 1/16 in. balsa). Remove the parts marked with a W. Lay them on your work surface with the etch marks facing up. If desired you may pin or tape W1 to the work surface. **Note:** The curved section of the wing is the leading edge, the straight section is the trailing edge.

☐ 2. Locate the two wing tip angle jigs numbered W2 (sheet 02/04, 1/16 in. balsa). Fit W2 within the notches provided at *right* and *left* sides of the integrated center section wing jig. Bond parts W2 with a small drop of medium CA glue to retain.

☐ 3. Locate wing parts numbered W3 (sheet 02/04, 1/16 in. balsa) wing tips. Use the interlocking tabs and notches that resemble one-half of a "zipper" to place the W3 wing tips against the mating half of the "zipper" at *right* and *left* side of W1 wing panel. Ensure that the leading and trailing edges are correct and the wing tip panels are fully seated both within the slot and bottoming out against your flat work surface. The correct dihedral angle for the W3 wing tips will be set by parts W2 as the wing tip will rest against W2 and within the slots at *right* and *left* of the W1 wing center section.

☐ 4. Have a look at the photo for "Step 5" and note the future removal of the integrated jig from wing center section. With this information in mind proceed to bond the wing tips to the wing center section being careful not to bond any of the removable jig parts to the wing assembly. Use only enough glue to retain the parts in their current position as you'll have a chance in "Step 5" to more thoroughly bond the wing tips after removal of the integrated jig.

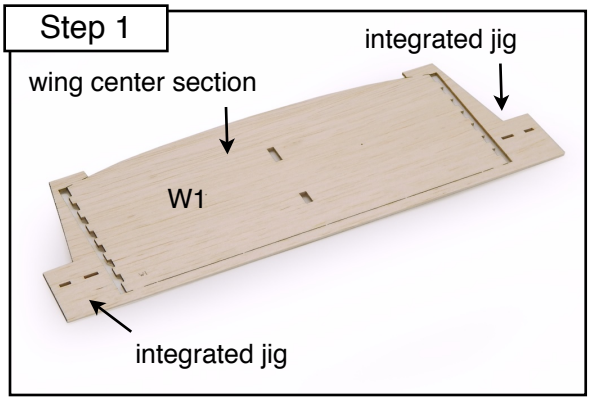
If using CA, bond parts together by placing spots of glue at each toothed area of the "zipper" along both top and bottom of wing panel to "tack glue" the assembly together. If using wood glue, lightly coat the *top/middle* section of the "zipper" surfaces to be bonded then assemble, allow ample time for the glue to dry. It may help to pin these parts into place to keep them aligned while the glue dries.

☐ 5. Once the glue has cured remove the integrated jig from the completed wing panel by simply snapping the two tabs off the jig at the leading edge of the wing and flexing the jig *down* and *away* from the center section of the completed wing trailing edge. Discard the jig.

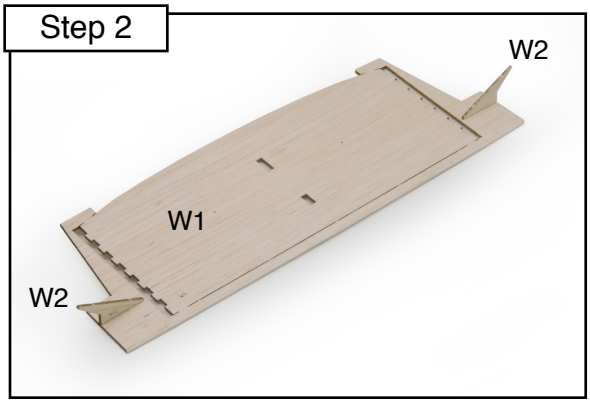
With the integrated jig removed from the wing center section, now is an excellent time to re-visit the "zipper" joint with additional glue to ensure it's thoroughly bonded. If using CA, wick glue within each cavity between the teeth of the "zipper" at both *top* and *bottom* of the wing assembly. If using wood glue, apply a thin bead of glue along the joint at both top and bottom of the wing assembly then level (smear) it into the joint with a finger.

Build Instructions

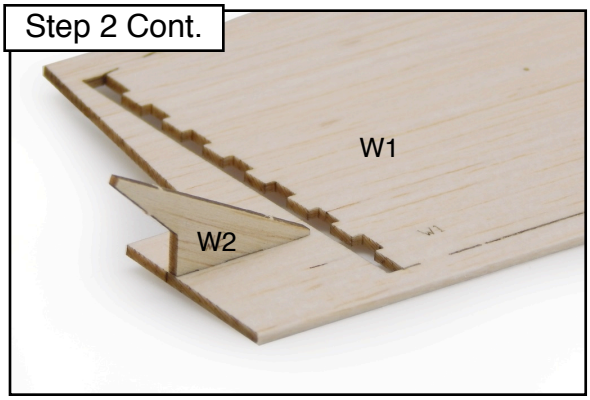
Step 1



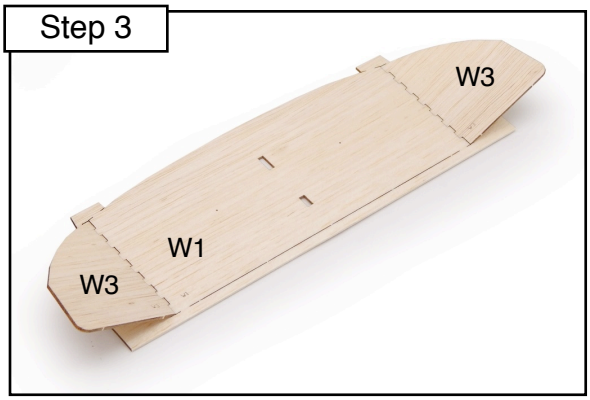
Step 2



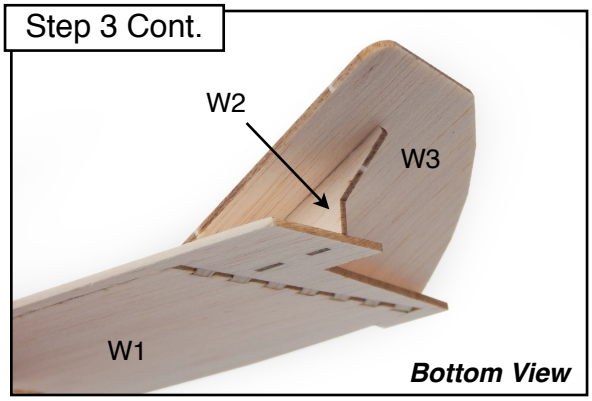
Step 2 Cont.



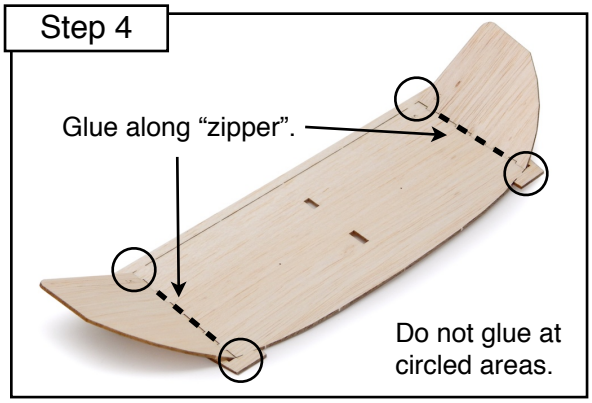
Step 3



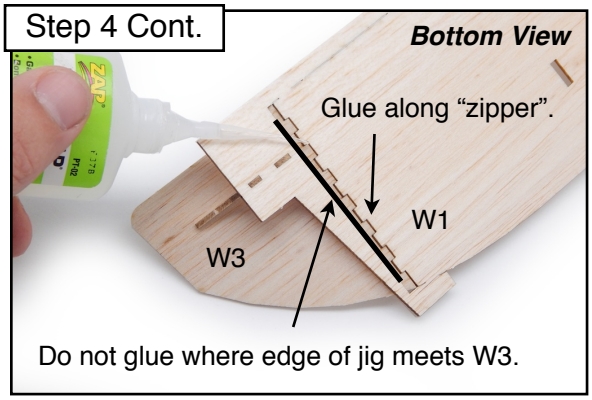
Step 3 Cont.



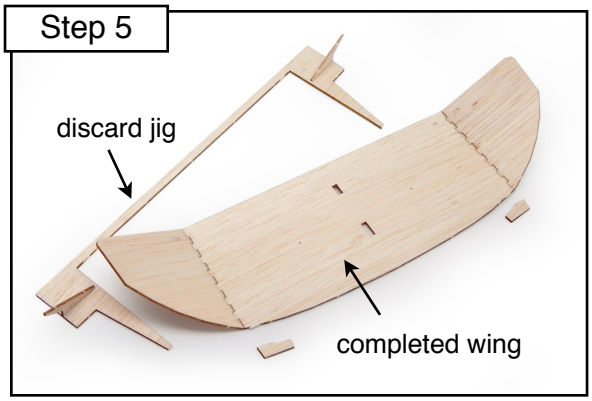
Step 4



Step 4 Cont.



Step 5



Build Instructions

Building Fixture 1 parts are designated with the letter "J" followed by a number. Parts have been numbered sequentially. The building fixture build order includes parts J1 and J2.

☐ 6. Locate parts J1 and J2 (sheet 02/04, 1/16 in. balsa). Insert the tab in J2 into the slot in J1. Ensure that they are perpendicular (form a 90 degree *right* angle) to each other. Please refer to the *Building Fixture 1* detail drawing on the plan set.

If using CA, bond parts together. If using wood glue, lightly coat the surfaces to be bonded then assemble, allow ample time for the glue to dry. It may help to pin these parts into place to keep them aligned while the glue dries.

Wing/Fuselage Assembly. Fuselage parts are designated with the letter "F" followed by a number. Parts have been numbered sequentially. The fuselage build order includes parts F1, F2, and F3.

☐ 7. Locate part F1 (sheet 03/04, 1/8 in. balsa). Identify the *front* of the fuselage marked F1. Just behind the cutout for ballast, at the *top* of the fuselage are two tabs that will secure the wing. Trial fit the completed wing assembly to the fuselage. **Remember:** The leading edge of the wing is curved and this must face the *front* of the fuselage. Place the base of Building Fixture 1 on the underside of the wing in the corner created between the wing and the fuselage joint. It may help to invert the assembly. Ensure that the wing is perpendicular (forms a 90 degree *right* angle) to the fuselage. Refer to the *Wing to Fuselage Sub Assembly* detail drawing on the plan set.

If using CA, bond parts together. If using wood glue, lightly coat the surface(s) to be bonded then assemble, allow ample time for the glue to dry. It may help to pin these parts into place to keep them aligned while the glue dries.

☐ 8. Remove one each, part F2 and F3 (sheet 04/04, 1/32 in. ply). Locate the 1/16 in. diameter x 1/4 in. length aluminum alignment pin packed in the hardware bag. Use the aluminum tube as an alignment fixture to place F2 and F3 on the *right* and *left* sides of the fuselage. Insert and *center* the aluminum tube in the alignment hole at the front of the fuselage, **do not glue** the tube into the fuselage. Next slide F2 over the tube on the *left* side of the fuselage. Make sure that the rear of F2 is fully seated against the underside of the wing. See *Assembly Profile View (right)* detail drawing for proper placement. **Do not glue the alignment pin as this will be removed after assembly.**

If using CA, bond parts together. If using wood glue, lightly coat the surface to be bonded then assemble, allow ample time for the glue to dry. Clamp F2 in place to keep it aligned while the glue dries, use a hobby clamp or ordinary clothespins.

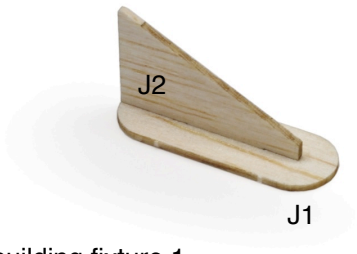
☐ 9. Slide F3 over the alignment pin on the *right* side of the fuselage. Make sure that the rear of F3 is fully seated against the underside of the wing. **Note:** Part F3 has no opening and will form the bottom of the ballast compartment. **Do not glue the alignment pin as this will be removed after assembly.**

If using CA, bond parts together. If using wood, glue lightly coat the surface to be bonded then assemble, allow ample time for the glue to dry. Clamp F3 in place, use a hobby clamp or ordinary clothespins.

Remove the alignment pin (aluminum tube) from the fuselage, before the glue dries.

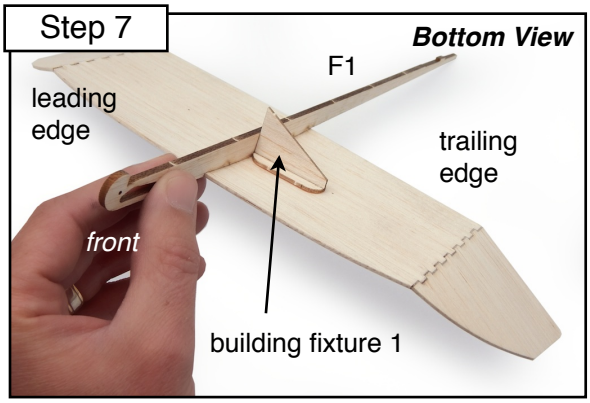
Build Instructions

Step 6

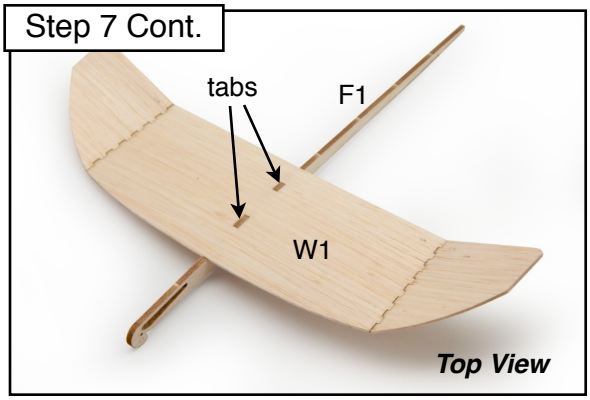


building fixture 1

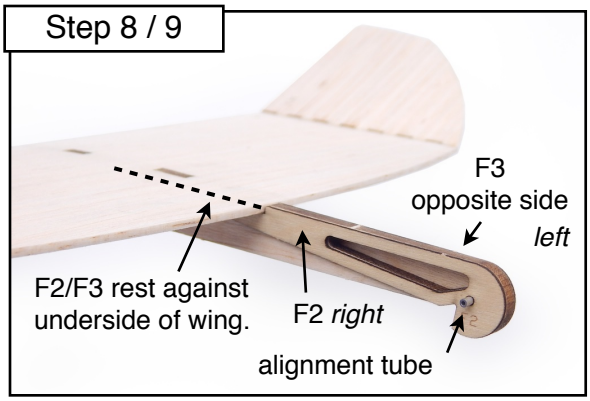
Step 7



Step 7 Cont.



Step 8 / 9



Build Instructions

Assembly (*continued*)

Tail Surfaces. Tail surface parts are designated with letters “H” and “V”. Also required to assemble the tail surfaces is building fixture 2, J3.

Note: The scimon glider was designed with the option to be built for both ***right-handed*** and ***left-handed*** pilots. Please follow the build sequence, differences in construction will be called out in the individual assembly steps below.

☐ 10. Remove the horizontal stabilizer part H (sheet 01/04, 1/20 in. balsa) and fit it to the *rear* of the fuselage. **Do not glue it in place!** Make sure that the etched side faces *up*. Next, remove horizontal stabilizer alignment fixture, Building Fixture 2, part J3-RH/LH (sheet 01/04, 1/20 in. balsa) slide it over the *top* of the *rear* fuselage. Refer to *Horizontal Stabilizer - Back View* detail drawing on the plan set for proper placement.

IMPORTANT!
For ***right-handed launch*** use part J3-RH, (half-round shaped fixture) ensure that the etching on part J3-RH faces the *rear* of the fuselage.
For ***Left-handed launch*** use part J3-LH, (triangular shaped fixture) ensure that the etching faces the *rear* of the fuselage.

The angle at which the assembly fixture sets the horizontal stabilizer controls the diameter of the circular flight path of the model.

☐ 11. When satisfied with the placement of the horizontal stabilizer bond it to the fuselage. **Do not glue the alignment fixture to the model.**

If using CA, bond parts together. If using wood glue, lightly coat the surfaces to be bonded then assemble, allow ample time for the glue to dry. It may help to pin this part into place to keep it aligned while the glue dries.

☐ 12. The final step in model assembly is to fit the vertical stabilizer to the fuselage, part V (sheet 01/04, 1/20 in. balsa). Insert the tab on the *lower* part of the vertical stabilizer into the slot on the horizontal stabilizer. Refer to *Assembly Top View* detail drawing on the plan set for proper placement.

IMPORTANT:
*For **right-handed launch*** use the slot marked RH on the horizontal stabilizer.
*For **Left-handed launch*** use the slot marked LH on the horizontal stabilizer.

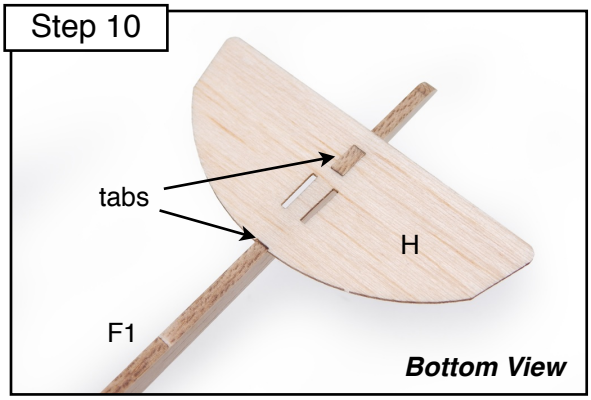
The angle set by the slots in the horizontal stabilizer of the vertical stabilizer controls the transition of the model from the launch portion of flight to the glide portion of flight.

When satisfied that the vertical stabilizer is in the proper slot and that it is perpendicular (forms a 90 degree *right* angle) to the wing center section, not the horizontal stabilizer, bond it in place.

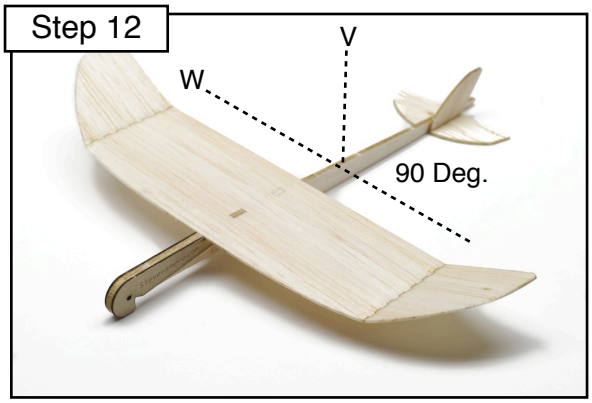
If using CA, bond parts together. If using wood glue, lightly coat the surfaces to be bonded then assemble, allow ample time for the glue to dry. It may help to pin this part into place to keep it aligned while the glue dries.

Build Instructions

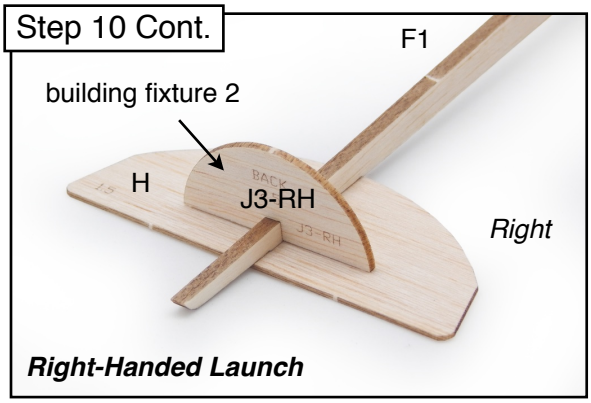
Step 10



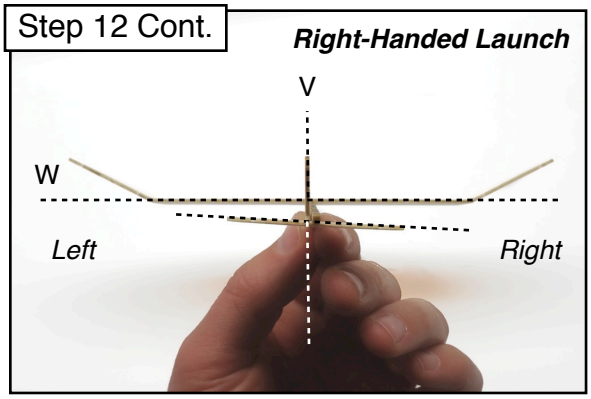
Step 12



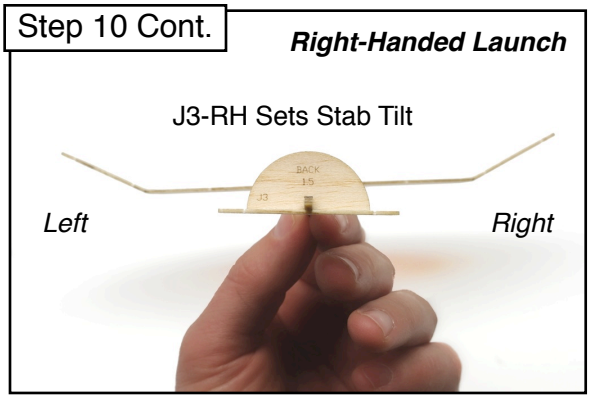
Step 10 Cont.



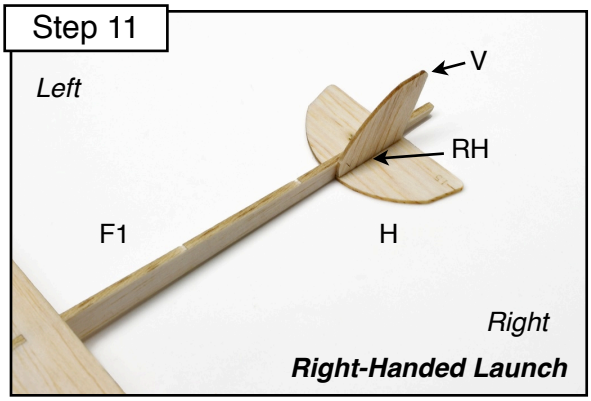
Step 12 Cont.



Step 10 Cont.



Step 11



Build Instructions

Catapult Assembly

Locate the hardwood dowel and the 24 in. x 1/8 in. rubber strip. These components are assembled to create the catapult launcher. Please see the *Catapult Assembly* detail drawing on the plan set.

☐ 1. Loop the elastic rubber strip in half, tie an overhand knot in the end within two inches, where the loose ends meet. Pull the knot snug, working the knot within one-half inch of the ends.

☐ 2. Place the dowel on top of the rubber loop within two inches of the knot.

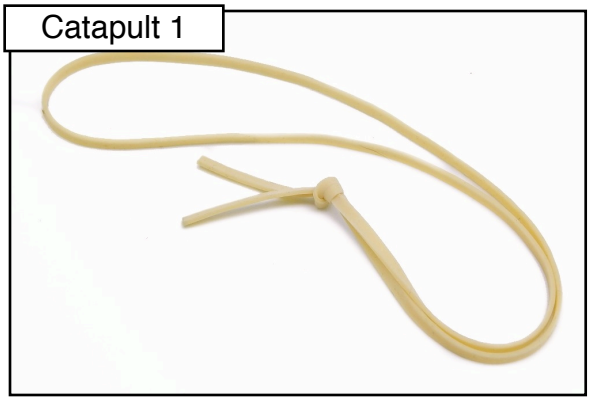
☐ 3. Wrap the loop end of the elastic around the dowel and feed through the opening between the dowel and the knotted end of the rubber strip and pull snug. Ensure that the knot is located against the dowel.

Optional: If desired, sand the model to remove the laser burn from the model. You may also paint the model with clear-lacquer to protect it from moisture, or spray a little color on the model to make it uniquely yours.

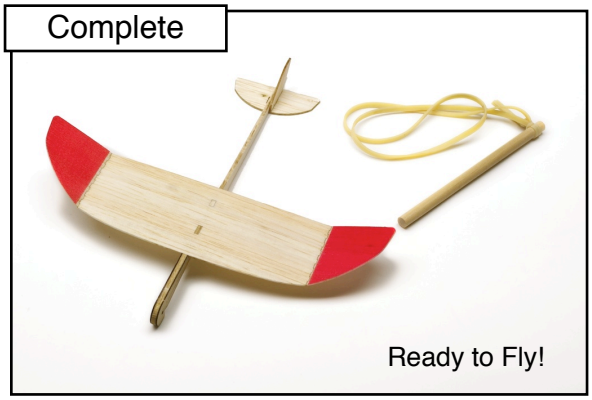
Please continue to the **Setup** and **First Flight** instructions to prepare the competed model for flight.

Build Instructions

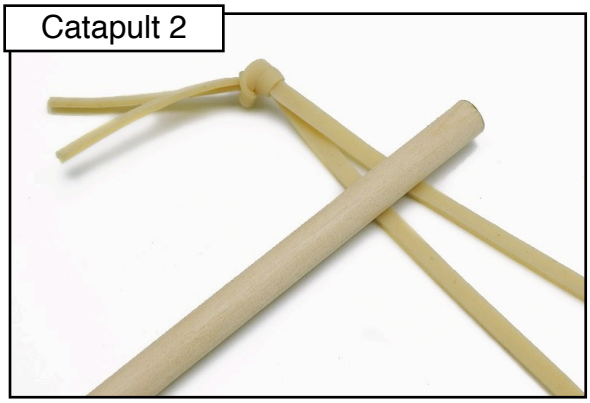
Catapult 1



Complete

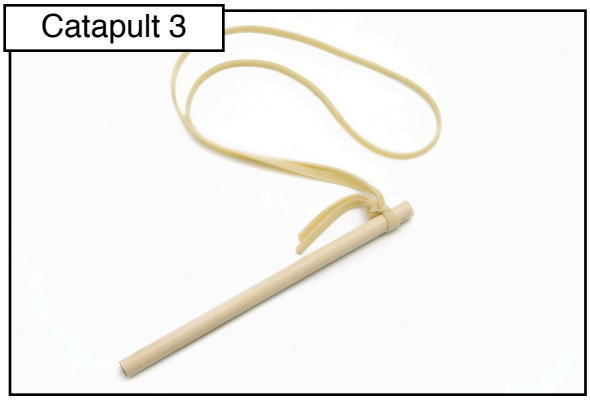


Catapult 2

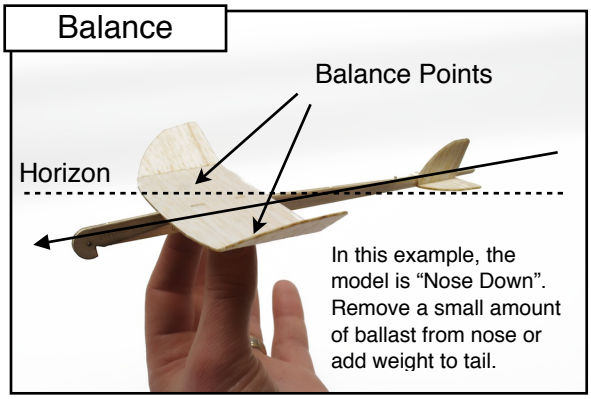


Launch

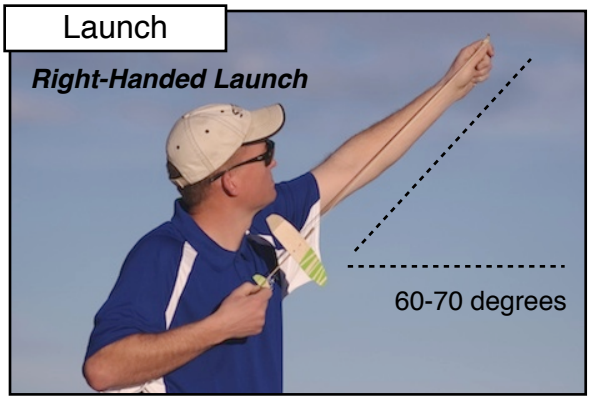
Catapult 3



Balance



Launch



Build Instructions

Setup

Balance the model. Balance the model as per the guidance given on the plan set. The starting balance point (Center of Gravity or CG) has been marked on the wing of the glider in the form of two small holes. See the plan set for the location of the balance point.

Suspend the model from your thumb and index finger at the balance points on right and left of wing. When viewed from the side the bottom of the fuselage should appear to hang level with the horizon. If the model hangs nose down, remove clay ballast from the nose or add clay ballast to the tail. If the model hangs tail low with the nose pitched up, add clay ballast to the nose of the model. Once you have adjusted the balance point proceed to glide test your model.

Glide test. The purpose of this test is to check the overall behavior of the model prior to using it under a more powerful elastic launch. **Do not neglect to perform this test** as hard gymnasium floors are a formidable opponent for the out of trim glider. Your scimon will not likely remain in one piece if fired into the ground at full power! The scimon was designed as an indoor glider but will still perform well outdoors in calm conditions. Perform this test in near zero wind conditions outdoors or pick a large indoor venue such as an auditorium or gymnasium. Pick a point on the horizon just to the ***right*** (*left* for *left-handed* launch) of the current wind direction (outdoors) and aim for it (this will result in a more level toss). With wings level to the horizon, give the model a smart but gentle toss. Resist the urge to toss the model up or shove it down.

Desired result: For models setup to launch ***right-handed***. The model should glide in a lazy **left-hand** turn and land at a near level attitude (*Left-handed* setup should produce a lazy *right-hand* turn).

If the models nose pitches *up* followed by an abrupt loss in both speed and altitude, the model is stalling. Try adding a tiny amount of ballast to the nose and try your toss again. Likewise, if the model dives abruptly you should try removing ballast from the nose and/or adding ballast to the tail.

Continue the glide test until you have achieved the *desired result* with your model.

If the model is not turning or gliding as expected, inspect your airframe for warps and proper assembly. Model balance will generally control the gliders speed and stall. Stabilizer tilt will control glide circle as will rudder to some degree (though rudder is really most effective at transition - more on that later).

First Flight

After a successful glide test it is time to try the model under power. The following instructions assume a ***right-handed*** launch, directions for *left-handed* launch will be just the opposite as given with regard to *right* and *left* designations.

Each flight can be broken into four distinct components setup, launch, transition, glide.

1. **Setup.** Launch angle and power are critical to a successful flight the scimon launches highest and transitions best when the following launch angle and power setup is adhered to.

   Grab your scimon and elastic launcher, with the launch stick held in your ***left*** hand and the glider in your ***right***; hook the loop end of the elastic through the launch lug (notch under the ballast pocket at the nose of the glider).

First Flight (continued)

With ***right*** hand, grasp the glider directly behind the vertical stabilizer on the bit of fuselage that extends *aft* of the rudder. Pull the glider back against the elastic just enough to tension the rubber and prevent the band from slipping off the launch lug.

Raise your ***left*** hand and outstretch your ***left*** arm out and away from your body.

Rotate the top of the scimon glider ***right***, away from your body, so that the main wing is nearly perpendicular to the horizon and the open portion of the "U" shape made by the wings oriented to the ***right***. While still grasping the glider drop your right hand down and away from your body to build tension.

Observe three things prior to release: One, the angle of the elastic; adjust hand positioning until the elastic and glider is inclined (aimed) at an angle of approximately 60-70 degrees. Two, again take note of the glider rotation angle (near perpendicular to the horizon - top of glider rotated away from body to **right**). Three, length of pull, build power slowly 24 inches of stretch (distance from launch stick in ***left*** hand to launch lug on glider) should be plenty to start.

Ready? Release!

Never launch scimon at another individual or when bystanders are not safely away from the action. Flying gliders tends to attract the interest of children and pets. Keep these individuals safe by keeping them involved or safely restrained away from the activity.
Never launch scimon with wings level at the horizon as the model will loop and potentially crash nose first into the ground upon exit of the loop (infamous figure 9).
Never launch scimon with wings inverted ("U" opening to the ground) this will result in the need to build a new scimon glider!

2. **Launch.** When setup, aimed, and released properly; your scimon will climb briskly in a tight ***right-hand*** (clockwise) corkscrew pattern. Vary the amount of power input given in your setup to place the flight apogee (the highest point of climb) as close to the celling as possible. High scores start with high launches but don't be tempted to shoot for the moon on your first flight. Build launch power as you build flying experience.

3. **Transition.** As scimon approaches, and proceeds through, apogee it should be slowing to glide speed and will flip or roll to the **left** beginning the glide stage of flight. A big stall (abrupt climb, nose drop, and altitude loss) following transition can be indication that too much momentum was carried through the transition, try reducing the launch angle by several degrees. Lack of altitude can be influenced by input power on launch and launch angle, increase one or the other, one-at-a-time. *While the transition will be influenced by glider trim (especially the rudder angle) we have found it to be a mix of proper glider setup and proper launch angle. Experiment with both until you can achieve consistent results.*

4. **Glide.** After the **left** flip at apogee the scimon begins a descending *left-hand* (counter clockwise) pattern until it lands. Your scores will be higher if you can trim scimon for a slow descent.

Congratulations on the first of many successful flights! At Stevens AeroModel we are committed to improving your building and flying experience. We are constantly refining our processes, designs, and manuals to reflect customer feedback. You may correspond with the Stevens AeroModel staff at:

email: support@stevensaero.com
Phone: 719-387-4187

Glider Trim Guide

Adopted from Don DeLoach's HLG Trimming Chart

Points to keep in mind when prior to making trim changes.

- Trim guide will not correct a poorly launched glider. Follow guidance in "First Flight" for proper launch.
- Rudder controls the launch and transition.
- Stabilizer tilt controls the glide circle diameter.
- CG (balance) and Incidence (decalage) work together to control the models pitch or glide attitude and air speed. Changes to incidence will often require changes to CG. Incidence has more of an affect on flight performance as the speed increases. Thus you'll change the incidence to solve looping during launch or nose diving after transition. CG changes more subtly affect the aircrafts flying attitude and will often be made to affect flight speed.

Problem	Cause	Solution
Model loops on full power launch and stalls often in glide.	Too much incidence (decalage)	Decrease incidence by warping trailing edge of horizontal stabilizer down.
Model pitches up steeply at launch then nose dives into ground.	Too little incidence (decalage)	Increase incidence by warping trailing edge of horizontal stabilizer up.
Model launches high with good transition but stalls often in glide.	CG too far back	Add small amount of clay ballast to nose until stall disappears.
Model launches high with good transition but is fast in the glide and slightly pitched down.	CG too far forward	Remove small amount of clay ballast from nose of model until slower glide is obtained.
Model glides nicely from level toss. Launches are high but model fails to consistently roll left* into transition.	Not enough left* rudder	Increase left* rudder by bending the trailing edge of the fin left* until left* roll out is obtained at transition.
Model rolls sharply to left* on launch additionally, model does not launch high.	Too much left* rudder	Decrease left rudder by bending the trailing edge of the vertical fin right* until launch is high and followed by a "flip" or roll-out transition to the left*.
Model launches high and transitions well but glide circle is tight (less than than 20' in diameter).	Too much stabilizer tilt.	Warp fuselage boom to decrease horizontal stabilizer tilt until the glide circle decreased to about 40' diameter.
Model launches high and transitions well but glide circle is wide (greater than than 50' in diameter).	Too little stabilizer tilt.	Warp fuselage boom to increase horizontal stabilizer tilt until the glide circle increases to about 40' diameter.
Model launches high and transitions well but glide tightens up into a tight descending spiral.	Not enough wash-in	Check model for warps and wing misalignment. Add additional wash-in on left* wing panel till spiral is reduced.

**Applies to right-handed launch. Left-handed launch will typically trim for the opposite direction.*

