PLEASE READ THIS FIRST

Many thanks for buying the Halfpipe!

To ensure a great maiden flight, there are several things we really want to emphasize before you begin building the kit, and before your first launch.

(a) **NAIL THE CG!!!** Wings of this type are very CG sensitive. Please follow the recommended CG placement and "Fine Tuning" procedure carefully… you will be glad you did!

(b) **DO NOT EXCEED THE RECOMMENDED ELEVATOR THROWS!**
One other aspect of planks, or pseudo plank-style plan forms, is that they need very little up / down elevator. Use the Dual Rates and/or End-Point Adjustments on your transmitter to dial-down your elevator to the recommended throws. If you exceed them, hyper-stalling, a feeling of sluggishness (meaning only the plane, but who knows?), and short flights are almost guaranteed.

(c) **TRY TO BUILD THE HP TO MANUAL SPECS.** We built and extensively tested many different prototypes, combing the strongest points of each, for this kit. Remember, ANY excess weight that accumulates behind the CG may, ultimately, need 2 to 3 times that weight in the nose to offset it (plus add in the original weight, and your all-up weight just increased significantly). The provided lead nose-weight was very carefully calculated for a standard build. Try to avoid a ton of extra strapping tape, unnecessary reinforcements, etc., and build this kit exactly to the methods we describe within the manual. This will guarantee a versatile speed range, ample strength, optimum speed and cleanliness, and a plane that will last a very, very long time.

As you flip through the manual, you will see many paragraphs, covering certain procedures in great detail, though an entire procedure may only take 2 minutes to complete. We felt it necessary to describe each procedure, adequately and in-depth, plus you may be able to use some of these construction elements on other airplanes, as well. A few extra minutes of building time can mean the difference between a rock solid, durable aircraft, and something that flies like a "June Bug" and/or comes apart on the first impact. Don't rush it… build it solid and clean.

The Halfpipe was designed for a flying style that is smooth, clean, fast, aerobatic, and with a maintenance of energy. Combat is, of course, not recommended, nor the slow-speed looping and bobbing common with the lighter, more back-swept flying wings… it's just not that kind of airplane, for many reasons. As you begin to get used it, you will see why we like it so much… it is extremely versatile, has a huge speed range, is very durable, and not too hard to build.

We are always learning, modifying, adjusting and improving our aircraft. Consequently, we continually update our website with the latest findings. The "Latest News" and FAQ sections can be checked for reference.

THANKS!!

☺

The Halfpipe

High Performance Slope Wing

Wing Span: 48” • Area: 432 Sq.In. • Typical Minimum Weight: 24 Oz.

Note: For the very latest info on any CG or building updates,
please check the “Latest News” section on our website.

www.northcountyflyingmachines.com

(858) 485-1137

~ NCFM ~

ASSEMBLY INSTRUCTIONS:

(Revision 4 – 6/10/2010)

Kit Includes:

(1) Wing (1.9lb Density EPP – Top Beds not Incl.)
(2) 22.5" Carbon Wing Spar Tubes / 1 Steel Joiner
(1) 10" Solid Carbon Fin Boom
(1) Coroplast Fin Mount Material and tape
(2) 24.5"+ Weight-Matched Balsa Elevons (outboard)
(2) 2-3/8" Balsa Fixed Center Elevons (stationary)
(2) 24.5" Basswood Drag Spars
(1) 1/4" x 4" Basswood Triangular Gusset
(2) 1/8" x 4" Basswood Tapered Gussets
(2) 4" x 8" Balsa Fin Sheets
(2) 22.5" Balsa Spar Cap Filler Strips
(4) Lead Balance Weight Slugs
(2) Elevon Control Horn Sets / 4 Machine Screws
(4) Nylon Clevises
(2) Threaded Control Rods
(1) Instruction Manual DVD

Materials Needed:

Epoxy: 5 & 20 Minute+
Polyurethane Glue: Gorilla, Elmer's Ultimate, etc.*
Goop, Shoe Goo, or Similar Clear Gel Glue (opt.)
Gap Filling Cyanoacrylate (Thick C.A.)
Strapping Tape (1" or 2" will work)
3M77 or Similar Spray Adhesive
Drywall Screen and/or Misc. Sandpaper
Lightweight Spackle (optional, but recommended)
Ultracote® Covering or Similar
2" Clear Poly Tape (we like DUCK brand)
Masking tape
(2) 6" Servo Lead Extensions
Max Ballast Tube: 9/16"dia x 9" for end-loading
Recommended Servos: (2) HS85-MG or similar
Recommended Rx: Berg, Hitec or similar **
Recommended Batt: 350mAh Nicad Flat or sim ***
Required Transmitter: One with Elevon mixing, end-point and/or dual rate adjustments.

**** Polyurethane Glue:*** ***This is not mandatory, but we prefer PU glue instead of epoxy for the main spar and ballast tubes (we use either "Elmer's Ultimate Glue" or "Gorilla Glue"). PU glue is lighter, far stronger, and can be used to fill gaps, including the elimination of the balsa spar cap. However, unless you are familiar with its properties, do a little experimentation first because it can be a bit unpredictable. There is a wealth of information on the internet about PU glue, as well as our website. For simplicity, the standard epoxy method has been referred to in this manual.***

***** Receiver****: **This is a thin wing, so you will need a thin receiver. It is also important to use the "end-plug" type since the "vertical-plug" type might not fit as easily. A Berg or similar low-profile 72 MHz Rx will fit nicely. The newer 2.4 GHz systems will work too but pay close attention to the antenna layout requirements and follow the manufacturers recommendations.***

****** Battery:*** ***The provided balance weight for the Halfpipe is based on a typical build, using a standard 350mAh Nicad flat pack, which weighs approx. 60 grams. The 720mAh NiMH pack is also similar in weight and should work fine. Since access to the foam nose for additional balance weight is difficult once the plane is covered, be conscious of any major weight differences when using other battery packs.***

Step 1 • Glue in Lead Balance Weight

The nose of the wing comes pre-cored for the provided balance weight, which consists of 4 lead slugs of approximately 35 grams each. Apply a 4" piece of masking tape to the top and bottom of the wing, over the entire cored balance chamber (since we make a vertical slice at the end of the chamber to remove the foam plug, glue can ooze out the surface of the wing, if not taped). Goop or epoxy 2 slugs per wing half, into each balance chamber. Ensure that the weight/glue dries level with each wing root. *This operation and Step 2 (below) can be performed at the same time, if you plan ahead and work quickly.*

Step 2 • Join the Wing Halves

On a flat, straight surface, tape the bottom wing beds together. Glue the wing halves together with 5min epoxy and use the spar channel to line them up properly. Cover the center section of the wing beds with a piece of wax paper or plastic grocery bag, to prevent gluing the beds to the cores. Set the wing into the beds and leave it to cure.

Step 3 • Glue in the Spar

Preparing the Spar and Balsa Cap Strips:
The first step is to glue each spar into the angled steel joiner: Using 220 grit or similar sandpaper, *gingerly* rough the outer surface of each carbon spar. Next apply thick CA (green Zap) to the inside half of the steel spar joiner and to the first 2.5" of one end of a carbon spar. Now shove the wet end of the spar, quickly, firmly, and fully into wet half of the steel joiner. The glue will set almost instantly, so you must be quick! Repeat the same process for the other carbon spar.

Now apply a full-length piece of masking tape on each side of the spar channel, and one on the bottom of the wing, directly below the spar channel (to prevent glue leakage); To do so, lightly sand the wing first, to remove any residual foam slagules that may prevent the tape from sticking securely. Without using glue yet, center the spar in the channel; using a Dremel tool or razor blade, remove small slices of foam from the walls of the spar channel to make room for the thicker spar joiner. The spar system should drop easily into the spar channel.

Near each tip, make a mark on the masking tape at the exact point where the carbon spar ends. Cut the two provided ¼" x ½" x 22.5" balsa cap strips so they completely cover the spar and joiner; there will be a small gap around the

joiner area that can be filled with glue or spackle. Relieve the under side of the balsa cap strip, at the center, to accommodate the joiner.
Remove both the spar and balsa strips from the groove and cut two small pieces of scrap foam from a wing bed to fill the tip area of the spar groove starting from the mark you made to the very tip of the wing (see Diagram 7). Glue these foam fillers into the tips of the groove using Goop or epoxy (Goop will allow better flexibility for both shaping and impacts); let the glue set and/or cure.

Gluing in the Spar:
Mix up a generous amount of slow epoxy (minimum 20min) and distribute it along the entire inside length of the spar groove (now with foam fillers at either end). Distribute the epoxy along the sides of the groove with a small piece of wood, making sure that the groove is wetted all the way to the top and out to the tips (the masking tape strips will prevent overflow from getting onto the wing surface). Remove excess epoxy…leave just enough so that the entire spar groove is wet. Press the spar system in the groove. Dribble a little more epoxy on top of the spar and add the balsa cap strips.

Make sure the wing is properly seated in the bottom wing beds, and position small weights along the cap strips and the surface of the wing to keep everything flat and level until the epoxy cures (Don't forget to remove the masking tape while the epoxy is still wet). After the epoxy has cured, carefully plane/sand down the balsa caps (there will be more balsa to remove near the tips) and foam tip fillers flush with the airfoil. Fill any gaps with spackle or the filler mixture of your choice, and lightly sand flush with 150-220 grit sandpaper.

Using the provided Wingtip Pattern (Diagram "A" at the end of this manual), cut the wingtips to the curved shape and then round the edges of the tips to a symmetrical shape; To do so, make the cut slightly oversize, then do the final rounding and smoothing with 120grit sandpaper. If you have access to Goop, you can also apply some "thinned Goop" over the tips at this point. This will facilitate better covering adhesion and give the wingtips impact longevity.

Step 4 • Glue on the Tapered Gussets and Basswood Drag Spars

The drag spars are the two 1/8" x 1/4" x 22.5" stiff basswood sticks that need to be glued to the Trailing Edge (TE) of the wing; part of their purpose is to allow the covering material to be shrunk very tightly without deforming the foam and crushing or warping at the TE… tight covering means better performance! Prior to gluing the drag spars onto the wing, you will need to glue a 1/8" x 4" tapered gusset onto one end of each drag spar (using thick CA); the non-tapered end of

each of the tapered gussets should be flush with the end of the drag spar (See Diagram 1 below). Trace and remove some of the foam at the TE to accommodate the shape of the gussets.

These gussets are very effective in transferring the shear loads that result from hard impacts and diffusing them. Do not omit them!

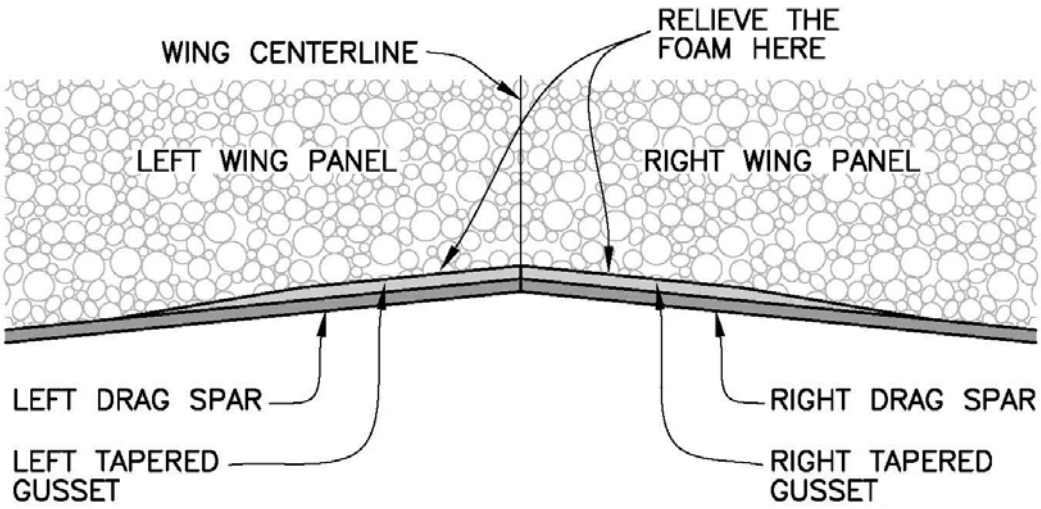


Diagram 1

STEP 5 • Glue on the drag spars:

Using slow epoxy, glue the 1/8" x 1/4" x 24.5" drag spars (with the tapered gussets inward, of course) to the foam trailing edge of the wing. Once positioned correctly, quickly secure the drag spars in place with short pieces of masking tape (from the bottom surface of the wing, around the drag spar, to the top surface). When the epoxy has fully cured, remove the small pieces of tape and sand the outer tips of the drag spars to match the length of the each wing half, and gently round off the ends to match the shape of the wing tips.

Step 6 • Install the Triangle Gusset and Center Fixed Elevons

For a number of reasons, including elevon line-up and efficient flight trim, this is the most important step in the building process… please take your time and make sure the installation is precise and clean.

Prior to gluing in the Triangular Gusset, the correct root angle must first be established and cut/sanded into the center-joint portion of the two short balsa Fixed Center Elevons (see Diagram 7)--the two short Fixed Center Elevons should meet flush together at the center root of the wing; they are supplied

oversized at 2-3/8” long each, but when finished should end up approximately 2” long each (or 4” when together, the exact length of the triangle gusset)

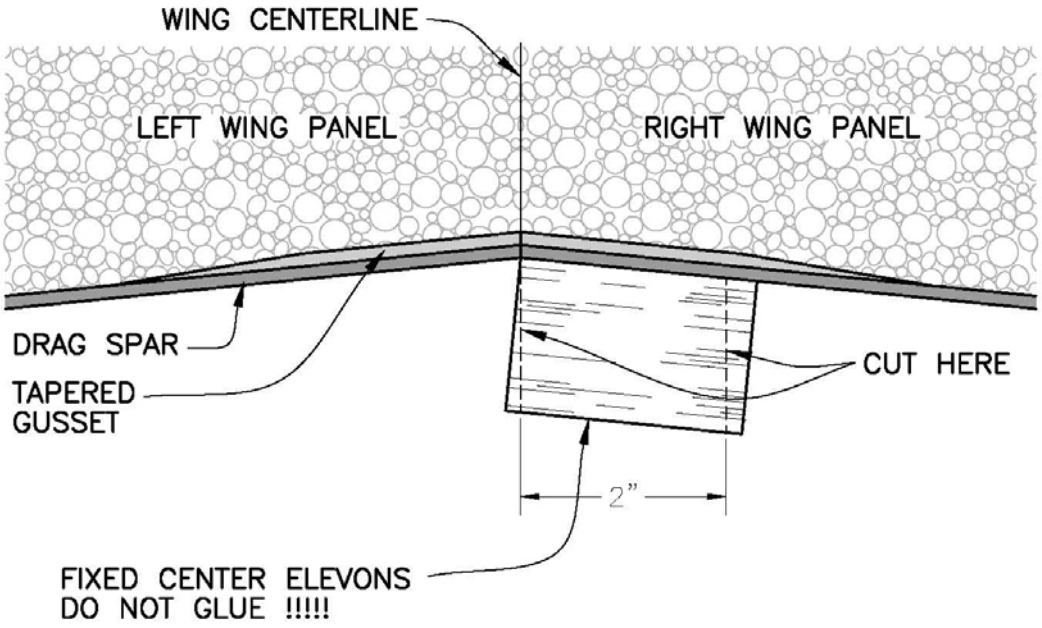


Diagram 2

So position each Fixed Center Elevon against the Drag Spar and make 2 cuts 2” apart and parallel to the wing centerline (see Diagram 2 above) to establish the root and outboard end angle.

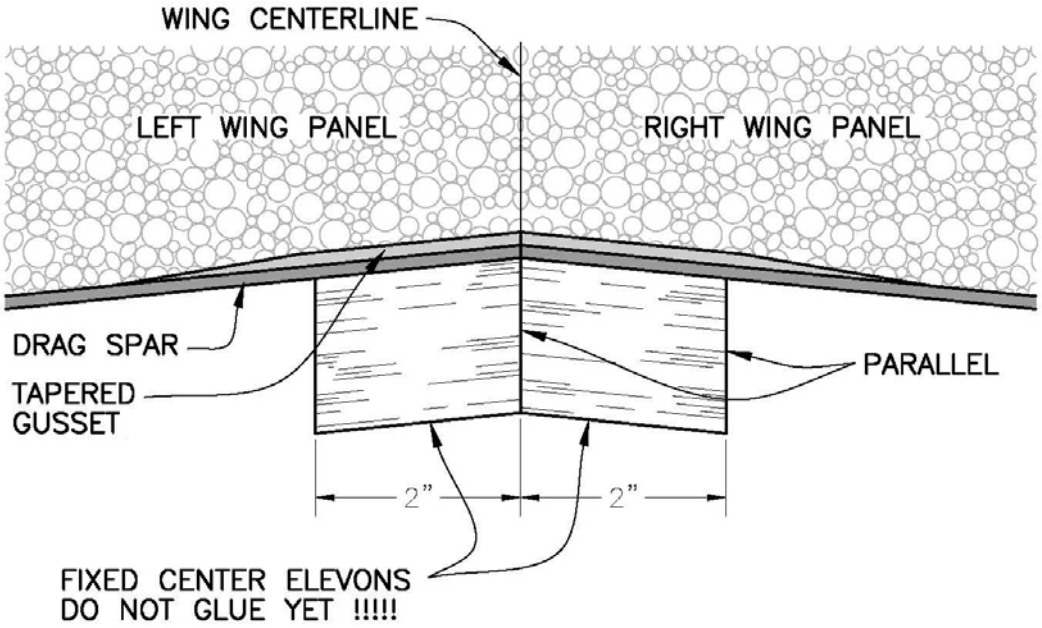


Diagram 3

Once you have completed the cuts for each Fixed Center Elevon, butt them together and position them against the Drag Spar (see in Diagram 3 above)

They should come together flush in the middle and flush with the Drag Spars.

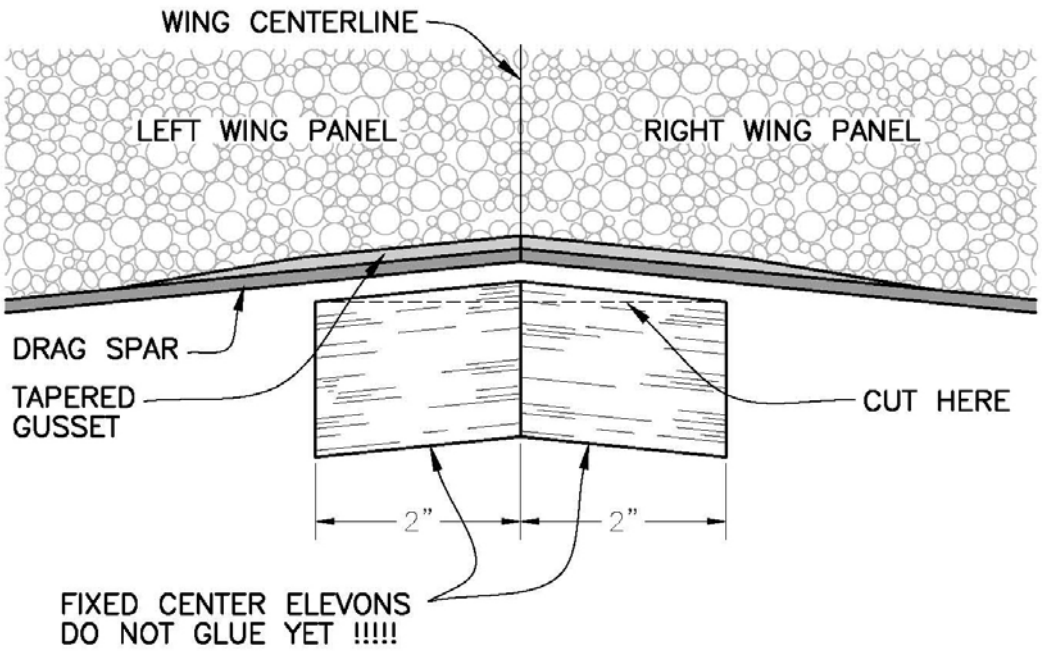


Diagram 4

Now pull the Fixed Center Elevons away from the Drag Spar and, while still together, using a fine point pen draw a line along the dashed line you see in Diagram 4 above. Cut along the line you just drew and discard the small triangular balsa pieces. *The triangular pieces of balsa you just cut away will be replaced by the Triangular Gusset in the next step.*

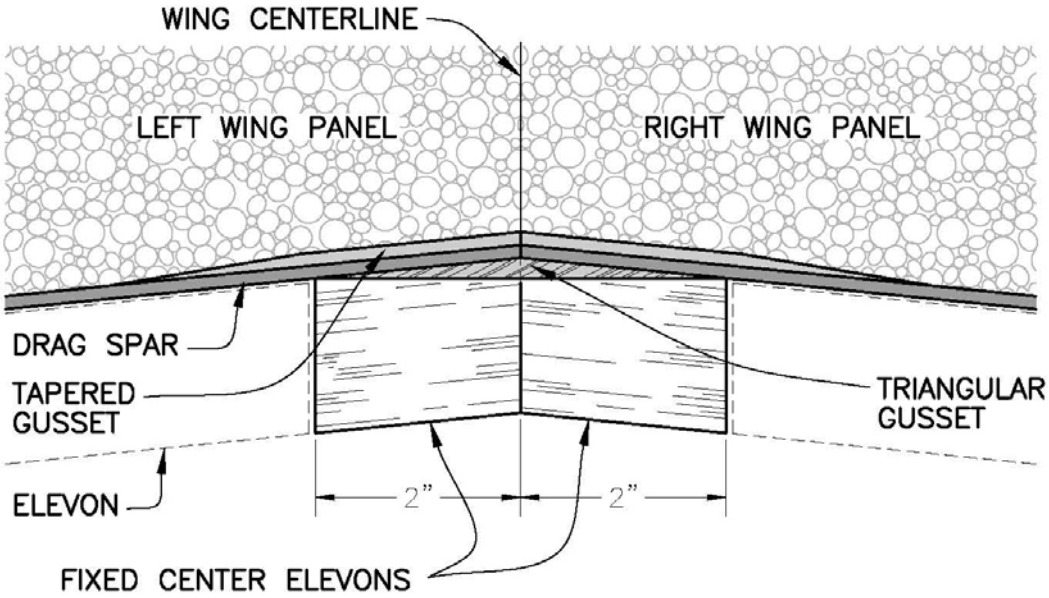


Diagram 5

Place the Triangular Gusset against the Drag Spars. *If the Triangular Gusset does not conform to the angle between the Drag Spars, go ahead and sand its sides until you have a perfect fit.* Now position the Fixed Center Elevons behind The Triangular Gusset. Test fit the parts to make sure they fit as you see them in Diagram 5 above.
Important Note: Do not bevel the leading edge of the Fixed Center Elevons.

Once you are satisfied with the fit of the parts, you are ready to start gluing them to the drag Spar. Start with the Triangular Gusset:

Using thick CA, glue in the basswood Triangular Gusset, insuring it is centered and flush with each drag spar (make this joint strong!).

Now it's time to glue the Fixed Center Elevons to the Triangular Gusset. But first you need to make sure they mate perfectly:

Without the wing beds, place the wing flat on your work surface and press down on the center rear of the wing so that the bottom rear half of the airfoil is flat against your work surface. Slide the left fixed center elevon into position against the Triangular Gusset; In this position there might be a slight gap between the two (if you don't see it on the top surface, then look from the side and check below). If the gap is there, the face of the leading edge of the Fixed Center Elevon needs to be sanded slightly. Repeat this procedure for the right Fixed Center Elevon.

You have a perfect fit when you have all of the 4 conditions below:

1. The bottom of the rear portion of the wing and the Fixed Center Elevon are flat against the work surface. (see Diagram 6 below)

2. The Fixed Center Elevon and the Triangular Gusset mate flush face to face.

3. There is a slight reflex (up elevator) in the Fixed Center Elevons. (see Diagram 6 below)

4. The two Fixed Center Elevons fit flush together in the center.

When the center elevons are able to fit flush together and flush against the back of the gusset, glue in the left Fixed Center Elevon first, using thick CA. When cured, glue in the right Fixed Center Elevon (you will also now be gluing the two Fixed Center Elevons together, at the root joint).

Double check the assembly to make sure that the slight reflex (roughly 1/16”) at the TE of the wing is still there, you can check this by laying a straight-edge across the top of the airfoil.

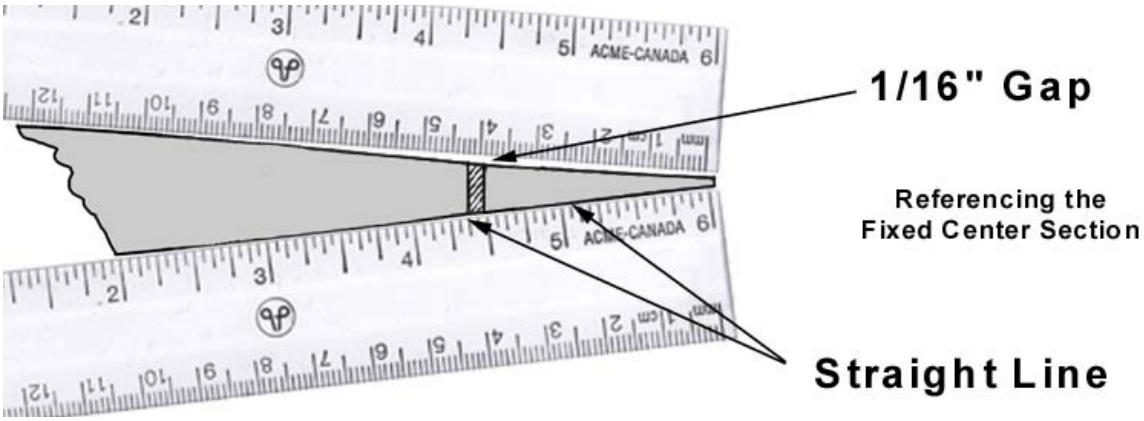


Diagram 6

Step 7 • Install the Servos

The Halfpipe was designed to use Hitec HS-85MG or similar size/torque servos, which typically come with an 8” to 10” wire lead. You will need to extend these leads by approximately 3” to 6” (by either soldering or purchasing extensions), so the plugs will reach the Receiver (Rx), once the servos are buried in the wing at the recommended location.

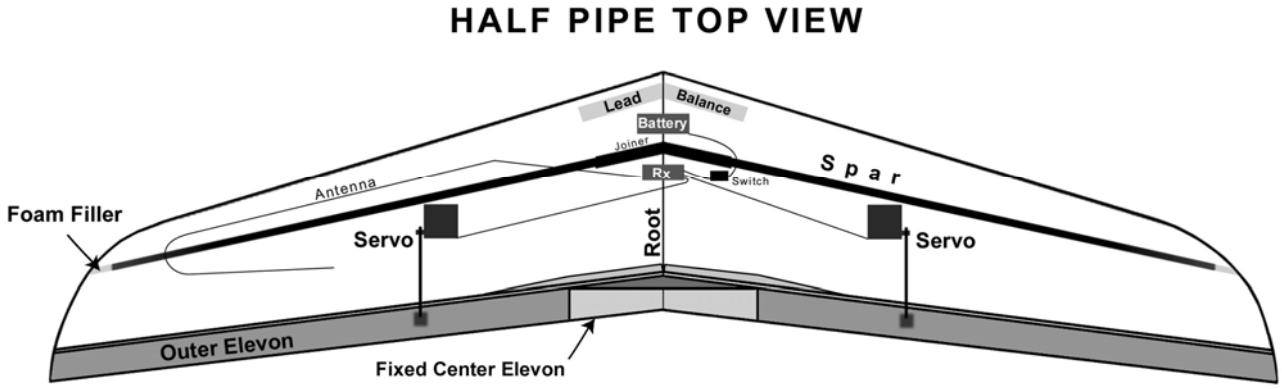


Diagram 7

** If you plan on using control rod fairings, and/or have a soft, grassy landing zone, the servos can be mounted on the bottom of the wing. This will increase flight efficiency, though it just makes them a little more vulnerable.*

See Diagram 7 • Position the servos on the top of the wing*, just behind the main spar, so the drive arm is approximately 9.5” out from the wing root; (drive arm should be at the aft side of the servo, for the shortest threaded control rod length). **Important:** Slightly rotate the servos so that the drive arms/control rods will be exactly parallel with the center root line of the wing, and direction of flight (do not position them at right-angle to the LE or TE). Trace around the servos with a pen and rout out just enough foam so that the servos fit flush inside the wing (make sure to relieve a little foam so the servo arms can go freely go through their full range of motion).

Potting the Servos: Since the Halfpipe has the ability to see extreme speeds, and the necessary elevator throws are very small, you do not want ANY wiggle in the servos themselves -- we strongly recommend “potting” them. Do one servo at a time: (a) When you are finished routing out the servo cavity, wrap the servo in a plastic sandwich bag or piece of a plastic grocery bag. (b) Mix a batch of 5-Minute epoxy and apply it to the walls and bottom of the servo well in the wing, and try to avoid the area where the servo drive arm is located. (c) Press the *wrapped* servo into the cavity while the epoxy is still wet, making sure it is perfectly positioned, and either slightly below, or flush with the airfoil (not sticking up above the surface of the wing). (d) When the glue has cured, remove the servo only and leave the plastic wrap behind. Then slowly peel the plastic bag away from the epoxy.
You should now have a perfect mold of your servo shape, allowing the servo to “snap in”, with near zero movement. Cut or rout out a shallow channel for the servo leads to reach the receiver. The servos will be capped in Step 8. *(Note: If you will be adding a ballast tube, it is best to install it prior to burying the flight gear or routing servo wires… please read the Ballast Notes on Page 17 first).*

Step 8 • Install the Battery, Receiver, and Antenna
(See Page 2 for battery and receiver requirements)

Referencing Diagram 7 on Page 9, mark the location and rout out the foam for the battery, the receiver (which goes between the spar and ballast tube, if installed), and any switch/charging jack you plan to use; they should sit just slightly below the surface of the airfoil. Cut or rout a shallow channel for all of your wiring, including the antenna, and position everything into place; nothing should be sticking up above the airfoil. The gear will be capped flush and taped over, shortly.

Testing the gear and centering the servos:

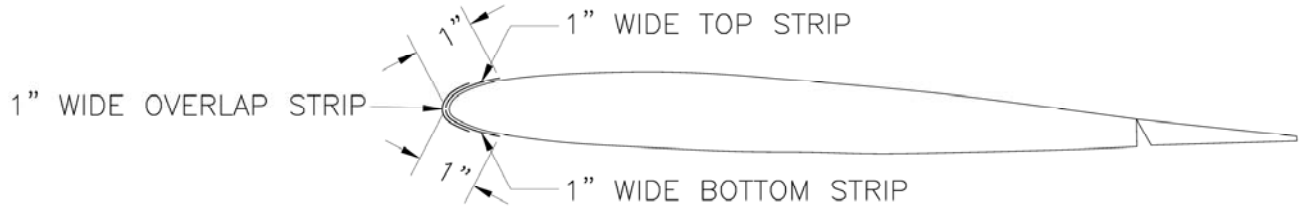
Create a new Transmitter (Tx) program for the Halfpipe, insuring all physical and digital trims are "zeroed". Turn everything on and make sure your servos are working, traveling cleanly, and in the right direction. Assuming top-mount servos, the left servo arm should move toward the LE, and right servo arm toward the TE, when left stick is applied; opposite for right stick; both toward the LE for back stick, and both toward the TE for forward stick. *Remember, once the wing is taped and covered, having to swap wires in the Rx will mean cutting through your beautiful covering job… now is the time to make sure all is correct!* At this point, you can apply a small dot of Goop, etc., to the bottom of the servo well, to help keep them locked in.

Cap all of the gear with scraps of foam or balsa, sanding them flush with the airfoil, to produce a clean surface in preparation for covering. We usually use a piece of double-sided carpet tape to attach scrap balsa to the exposed area(s) of the gear (including servos), sanding the balsa flush with the airfoil; you can use the scrap balsa left over from making the fin.

Optional, but recommended: Apply "Lightweight Spackle" over the spar, capped gear, servos, wiring, tips, fixed center elevons/gusset area, foam/drag spar joint, etc.. Let dry overnight and very gently fine-sand until flush with the airfoil.|

Step 9 • Strap and Cover the wing!

Strapping the Leading Edge and Center Section (very important!): Temporarily cover the servos with small squares of masking tape. Spray the center 10" of the wing top and bottom, with adhesive spray; let dry at least ½ hour. Do the same for the front 1" of the LE, top and bottom. Apply a long strip of strapping tape, 1" wide, along the top surface of the LE, span-wise, from the nose to just where the tip starts to curve. Apply another strip along the bottom surface of the LE. The front edges of these two strips should just touch along the sharp edge of the LE. Now apply a third strip of strapping tape, 1" wide, span-wise that warps around the LE. Along its length, this third strip should overlap half of the width of the top and bottom strips.



Now, apply strips of 1” or 2” wide strapping tape chord-wise, nose to TE, top and bottom, starting from the center, moving outward until about 3” past the end of each fixed center elevon; blade off the strapping tape at the TE of the wing… do not wrap around the drag spar or fixed center area. The whole center 10”+ of the wing (top and bottom), plus each LE, should be now covered with strapping tape: Use a hot iron to shrink the tape tight, being careful not to change the reflex angle of the Fixed Center Elevons.

Covering the Wing:
First, make sure your servo control arms are vertical and centered when everything is turned on and neutral; if so, you can deflect them to near the surface of the wing and turn everything off—this makes for easier covering. Whichever covering material you use (we recommend Ultracote), first mist the entire wing with adhesive spray and let dry ½ hour before applying the covering. Cover the bottom first, at the lower, recommended temp, just to melt the adhesive backing, but not to shrink the covering. Increase the temp for the tips and edge points, though be careful, as too much heat or shrinking of the tip covering will suck in the drag spar/foam, leaving a gap at the LE end of the elevon. Lower the temp again and repeat for the top. When the wing is completely covered, begin shrinking from the middle outward, continually referencing the wing to the bottom beds (if you are not covering the wing on them), to insure that there are no warps or twists. Again, be careful not to change the reflex angle of the Fixed Center by over-shrinking that section—double check the 1/16” reflex when finished.

Step 10 • Cut, Sand and Cover the Elevons

Cut or sand the inner edge of each elevon to match the exact angle of the fixed, center elevons. Smooth-sand the elevons with a sanding block, making sure they are no thicker than the drag spar. Bevel the LE of both elevons to 30 degrees, to allow optimum down deflection – (See Diagram 8 below). Cut the elevons to length and shape to match the wing tip. Cover the elevons and insure there are no warps or twists.

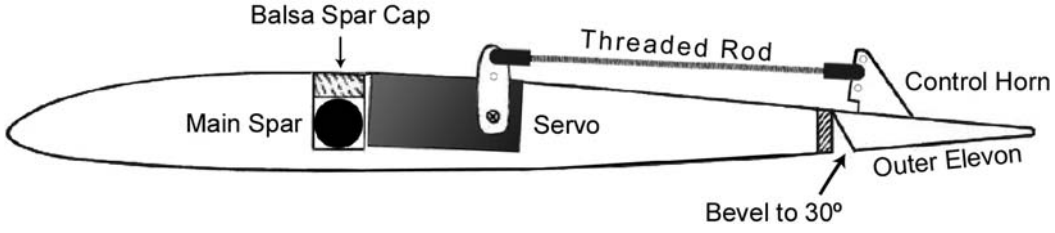


Diagram 8

Attach the elevons to the wing with full length, ½" wide strips of tape (a tape thickness of 3mil or greater is recommended, and we like the clear vinyl tapes); make sure the elevons can move through their full travel without binding, and that there is 1/16"- of airspace between each elevon root and its adjacent fixed center section.

Step 11 • Install the Control Horns and Push Rods

If you haven't already, make a tiny slit in the covering to expose each servo arm. Turn the plane on and center all controls. Now, turn the plane off, then the Tx, and install the control horns on the elevons. Make sure they are in-line with the servos, and exactly parallel to the center root of the wing (and direction of flight). Cut or file the threaded push rods to the correct length (if necessary) and *fully* twist on the nylon clevises; install the control rods. The edges of the outer elevons should line-up exactly with the fixed center elevons, when sighting from the TE.

Setting the Elevon Travel Distances:

The **elevator** function requires very little movement, about 1/4 of an inch, total (**1/8" up, 1/8" down**) or less, but no more than that.

This is HUGE!!! Even if you think you won't have enough elevator throw, do not exceed these travels, until you have flown it, and are certain you want more.

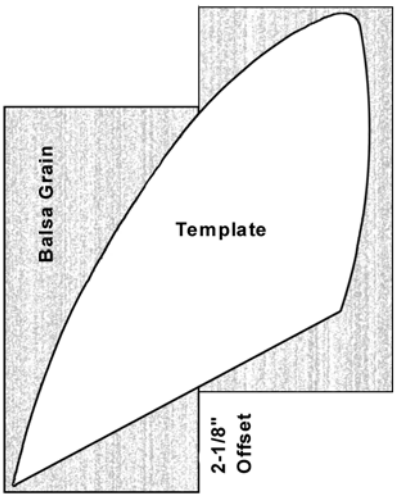
The **aileron** function is a little more preferential, and requires more movement. The total aileron/roll throw should be approximately 3/4 of an inch (**3/8" in either direction**), or less.

Once the plane has been trimmed and flown, you can increase or decrease the servo travel distances for more/less sensitivity.

Step 12 • Make the Fin and "Coro-Plast" Mounting System

Make the Fin:
Print and cut out the provided fin pattern in "Diagram B" at the end of this manual.
Caution: Make sure you print the diagram at full scale and make sure the scale bar at the bottom measures 2" long. If not, the fin will not be accurate is size and this will adversely affect the performance of the plane.

Position the two 4”x8” pieces of balsa fin material side by side on a flat surface, so they fit flush together (sand, if necessary).



To accommodate the fin pattern, you will need to slide/offset one of the balsa pieces by 2-1/8”, with the grain running vertically; the fin will *just* fit, diagonally. Using thick CA, join the two pieces of balsa.

Trace the pattern onto the balsa and cut out the fin. Sand the LE and TE edges round and cover the fin, making sure there is no warping; leave the very bottom edge uncovered, as it will later be glued to the carbon boom.

Make the Coro-Plast Mount System:

Print and cut out the Fin Mount Pattern in “Diagram C” at the end of this manual. Overlay the pattern onto the provided piece of Coroplast. It should be lined up so that the exact center of the pattern runs along the exact middle of the center flute in the Coroplast. Trace and cut the Coroplast mount.

This is optional, but for optimum aerodynamics when the mount is taped onto the bottom of the wing, we recommend using a Dremel tool to rout out about ½” of the flutes on the inside of the Coroplast, along the sides and smallest end only; do not rout out the central flutes along the widest, V-section at the rear of the mount, as this is where the fin boom slides in. We use 3 of the smaller #420 Dremel cut-off wheels stacked together on one mandril, but use any method that works best for you.

So there is no binding or tearing of the Coroplast, slightly round one end of the carbon fin boom and firmly slide it 2.5” into the center Coroplast flute; this “pre-fit” will limber up the plastic and make the boom easier to insert once the fin has been attached. Remove the carbon fin boom.

Attach the Fin to the Carbon:

This method is simple, and may not sound like much, but it is *very strong* and takes impacts well. Lightly rough up the exterior of the carbon for a good glue bond. Using thick CA, securely and straightly glue the fin to the carbon rod,

with the TE of the fin terminating at one end of the carbon. When the glue has cured, tape the fin to the boom with one 8" long piece of 2" clear poly tape: the tape should wrap around the bottom of the carbon, extending up onto either side of the fin about 7/8". Press the tape down cleanly at the joint to make a nice fairing along the base, with no gaps between the tape and the fin and trim off any excess. Mask off the fin and mist the front 2.5" of the carbon fin boom with adhesive spray -- let dry AT LEAST 5 hours, and overnight is best. The adhesive spray provides additional rotational grip, as well as an interesting lock: As you attempt to rotate the fin with firm pressure, it will first resist, then finally "pop" and move more freely; when left alone for a 10-30 seconds, it will reset to the previous firmness. When the adhesive spray has dried, insert the exposed 2.5" portion of the fin boom fully into the rear, center flute of the Coroplast mount (wider end), so the LE of the fin stops at the Coroplast, with the pre-installed 2-sided tape facing up… make sure the fin is at a perfect right-angle to the mount.

A crooked fin will cause significant degradation in speed and performance. So, using a method of your choice (i.e. reference marks on masking tape, right angled lines on your workbench, etc.), prepare to stick the fin mount to the bottom of the wing, **making sure it is straight**! Peel-off the tape backing of the coroplast mount and lightly tack the mount to the bottom of the wing… sight it from the LE for straightness and, when lined up perfectly, mash it tight!

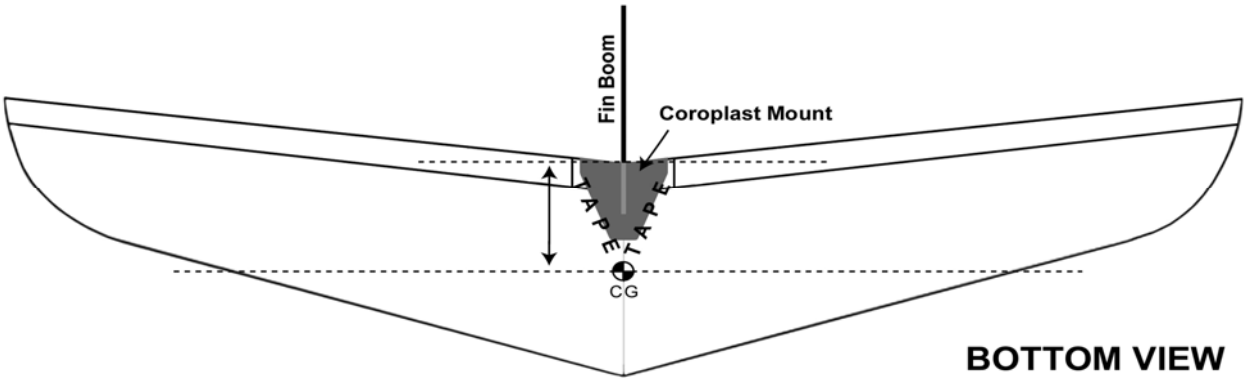


Diagram 9

Finally, using a strong tape (2" vinyl or PVC tape is great), secure the perimeter of the Coroplast down to the wing. If you routed out the perimeter flutes, the side-walls of the Coroplast will squeeze together as you tape the Coroplast down, for better aerodynamics. Little things add up!

Step 13 • Balance the Halfpipe & Get Ready to Fly!

The starting CG on the Halfpipe is 5-3/4" from the very back center "V" of the balsa trailing edge of the wing. Since the plane will not fly properly if the CG is as little as 1/16" off, please do not rush this process. "Fingertip" balancing will absolutely not work, so make a quick balancing jig using a couple of sharpened Popsicle sticks clamped 5" apart and vertically level in a vice, or pound a couple of long nails through the bottom of a 2x4, etc.

Place a 6" long strip of masking tape on the bottom of the wing and mark the CG thereon. Since you cannot reference the LE or TE, given their angles, you will need to make your initial CG mark on the center root-line, then carry it out a few inches in either direction, at a *perfect* 90º angle to the exact center root. You should now have a thin, 6" line, that is exactly perpendicular to the center root and direction of flight, located 5-3/4" in front of the very back center "V" of the balsa trailing edge of the wing.

Balancing:

Position the Halfpipe on the balance jig so the vertical points are dead-on the CG marks. It is helpful to place a block of wood or other object an inch or so below the fin, as a stop, to keep the tail from falling backward off of the balance jig (when tail-heavy). Place small lead weights on the top of the wing, where necessary, so the plane balances perfectly on your marks.

As with most high performance flying wing airfoils, the CG is critical. When the necessary amount of weight has been determined, place a temporary tape cover over the lead for the first few flights (unless using stick-on weights), until the CG is well established… you can then hide the lead with a method of your choice; (note: tail weight can also be added inside the flutes of the Coroplast, if necessary).

Fly!

With the plane now charged and balanced at 5-3/4", place an additional 7 gram sticky weight on the nose, to be used for "dialing in the sweet spot". For the maiden toss, it is also a good idea to "transmitter-trim" about 1/16" of up-elevator—just in case, and give it a straight, firm, and level launch, with a good follow through…not too wimpy, not too hard… more like a javelin than a baseball. Carve your turns for a little while, until you become used to it, then follow the "Fine Tuning" steps on the next page.

Fine Tuning

Important: Begin moving the supplemental 7 gram sticky weight back until the plane feels smooth yet very peppy on the turns and vertical pumps. Make very small movements with the weight, about 1" at a time. Properly CG'd, the Halfpipe will be fast, stable, maintain energy extremely well in both light and heavy lift, fly effortlessly inverted, snap turns, and have great spiral and yaw stability. For lighter air, you might also prefer the CG back a little more than usual. If it doesn't have ALL of these properties, it is likely due to one or two things: (a) Your CG is not yet perfect; (b) You have too much elevator throw. In our experience, it is usually both.

Ballasting

The average minimum flying weight of the Halfpipe is 24 ounces. In anything other than "extremely unique conditions", the Halfpipe seems to fly best at this weight; penetration is excellent, the speed is impressive, and agility is optimum. If you added a ballast tube, or plan on weighting it up somehow, here are some thoughts: So far, we have found that 4-6 ounces of ballast is pretty much optimum for heavy wind conditions. Beyond that, as with most back-swept flying wings *at equal wing loadings*, you may find a point of diminishing returns. In essence, the speed increase is slight, but is offset by a degradation of crispness in the turns. It will depend on your style of flying, as well as conditions. More weight is not always better, even in heavy lift. A clean wing will slice and maintain energy beautifully, so very slowly and logically increment your ballast to learn the optimum wing loading and flight characteristics for various conditions. With ballast, "carving" a turn is usually more beneficial and will maintain speed better than a "bank 'n yank". If you did not add a tube but would like to ballast, try some square pieces of flat, 1/16" thick lead sheeting, taped on the bottom of the wing (finished and flown), directly on the CG. We usually make 2oz, 4oz & 6oz plates, which can also be combined. You will need to pre-balance each lead square on a ruler's edge, etc., and make a line across the lead, to mark its own CG. Then, line that line up with the CG line on your wing, tape it, and off you go…

Final Notes:

As always, we often update the "Latest News" section on our website with any new building, trimming and / or modification info that might be of benefit. It really is a fun little plane and you have our warmest thanks for buying one… happy air! :^)

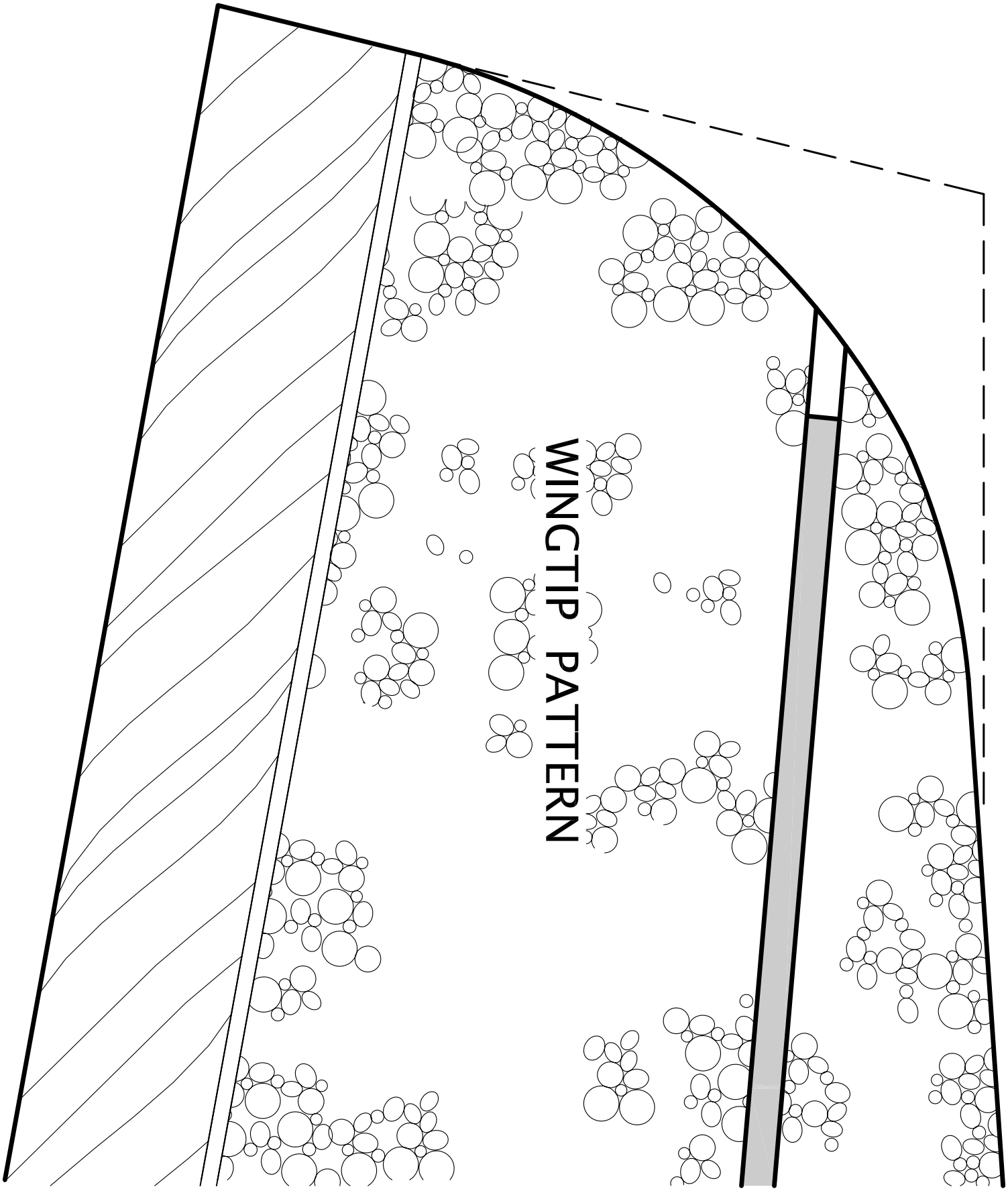


DIAGRAM "A"

HALFPIPE

WINGTIP PATTERN

FULL SIZE

AFTER PRINTING THIS PAGE MAKE SURE THIS SYMBOL MEASURES 2" LONG

0" 1" 2"

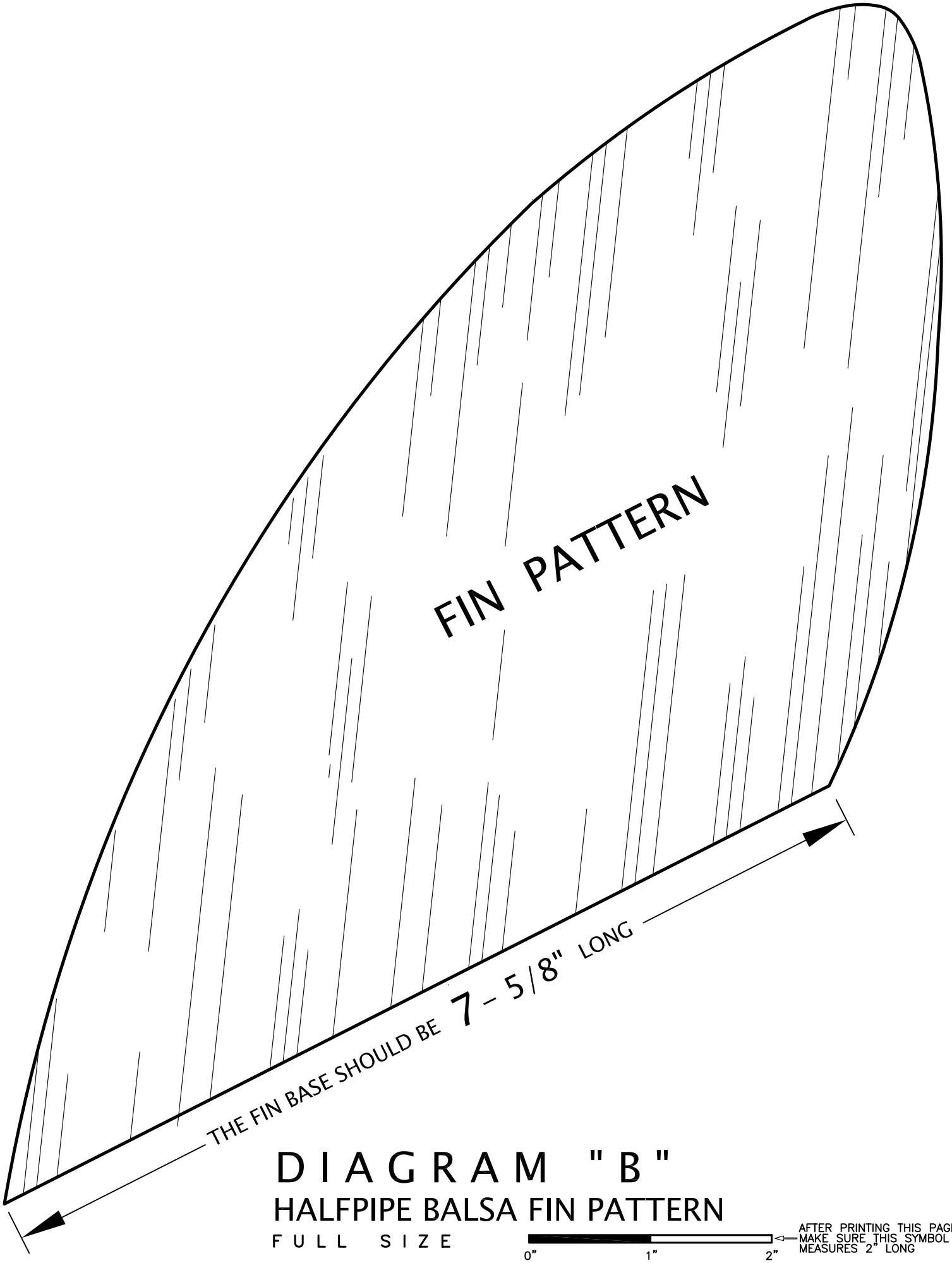


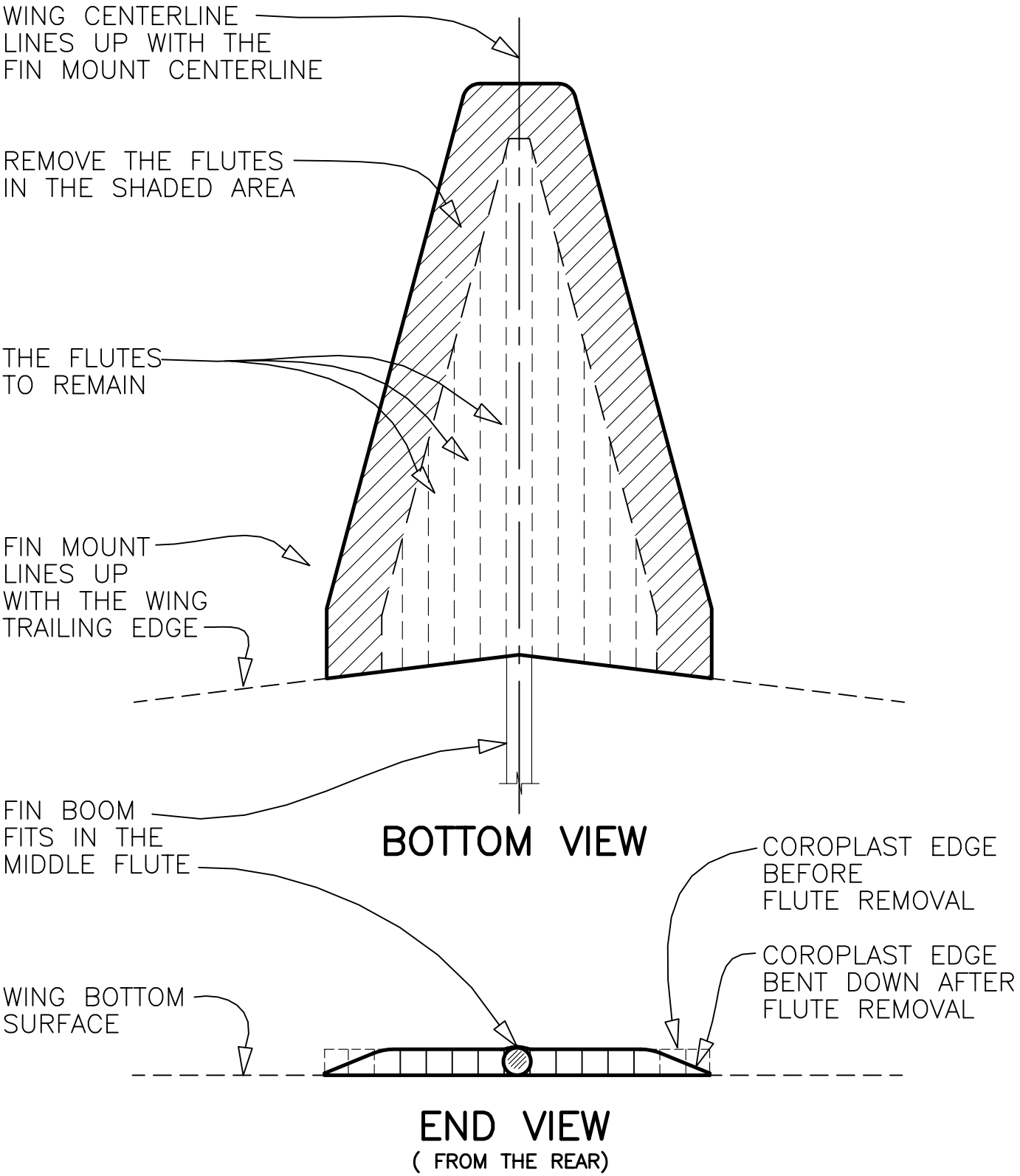
DIAGRAM "B"

HALFPIPE BALSA FIN PATTERN

FULL SIZE

AFTER PRINTING THIS PAGE MAKE SURE THIS SYMBOL MEASURES 2" LONG

0" 1" 2"



D I A G R A M " C "

HALFPIPE COROPLAST FIN MOUNT PATTERN

F U L L S I Z E

AFTER PRINTING THIS PAGE MAKE SURE THIS SYMBOL MEASURES 2" LONG

0" 1" 2"