

SKY-FERRY

A big, easy-to-build model with a big payload section. Flies high on 24mm D or E engines!

Specifications:

Length: 29"/73.66 cm
Dia.: 1.326"/33.68 mm
Weight: 3 oz/86 gm
Skill Level: Beginner

Recommended Engines:

(24mm) C11-5 ; D12-7 ; E9-8;
(18mm, with Adapter EA 18/24. not included) B6-4;
C6-5 or 7.

This is a model rocket kit requiring construction. Tools, adhesives, finishing materials, launch equipment and engines are not supplied.

A great first or second model rocket kit! Features balsa wood fins & nose cone, bright parachute recovery & quick change engine hook!



KSF - 24

AEROSPACE SPECIALITY PRODUCTS

www.asp-rocketry.com

About the "Sky-Ferry"

Recommended Engines: (24mm) C11-5 ; D12-7 ; E9-8; (18mm, with Adapter EA 18/24. not included) B6-4; C6-5 or 7.

Approximate Center of Pressure: 23.5" from tip of Nose Cone.

For safe, stable flight, the Center of Gravity (balance point of the model) should be at least 1.5" ahead of the Center of Pressure.

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Please read the instructions thoroughly before beginning.
Test fit all parts before applying adhesive.

Parts List - Be sure to check the following list to assure your kit is complete:

1 Long Body Tube (White), 1 Short (Payload Section) Tube (White), 1 Engine Tube (Red), 1 Pusher Tube (Yellow), 1 Tube Coupler (Brown), 1 Balsa Nose Cone, 1 Balsa Fin Stock, 1 Engine Block, 2 Centering Rings, 1 Spacer Tube (Green), 1 1/8" Launch Lug, 1 3/16" Launch Lug, 1 Metal Engine Hook, 1 Kevlar® Shock Cord, 1 Elastic Shock Cord, 1 Plywood Bulkhead, 1 Screw Eye, 1 Decal Sheet, 1 Parachute Kit.

Tools & Materials - You will need the following to complete your model:

Required: Adhesive (A wood glue, such as Elmer's Carpenters Glue or Titebond can be used for all steps and is recommended. Cyanoacrylate ["CA"] glue is recommended, but not required, for a few steps. Other adhesives may be used if you are familiar with their use and prefer them. We highly recommend that you read "**Some Notes on Adhesives**" in the "**Tips & Info**" section of our website: <http://www.asp-rocketry.com/tips.html>); sandpaper (medium - 220 or 280, fine - 320 or 400, & [optionally] extra fine - 500 or 600); pencil or ball point pen; felt tip marker; scissors; cotton swab ("Q-Tip", or piece of scrap balsa wood); hobby knife with a sharp #11 blade; metal straightedge/ruler; tape.

Optional: sanding sealer (or balsa fillercoat); thinner (appropriate type for the sanding sealer); small paint brush; paint (Spray paint, such as Krylon, Pactra or Testors is recommended. Be sure not to mix different types or brands of paint without testing.) - primer, colors as desired & clear, filler material (such as Elmer's Fill & Finish, Elmer's Professional Carpenter's Wood Filler or interior spackling paste); sanding block; tack cloth.

Assembly Instructions

1) Locate the longer of the white body tubes. Very lightly sand the outside the of the tube with medium or fine sandpaper until the surface just loses its' shine. This will allow the glue to penetrate the paper of the tube and the fins to stick to the tube better. Locate the Tube Marking Guide on page 7, and with your scissors, cut it out. Wrap the guide around the body tube - line up the marks on each end to align the guide (see Figure A). Use a piece of tape to hold the guide in place. With a sharp pencil (or pen), mark the body tube at the arrows at the end of each line for the fins and the launch lug. Remove the guide from the tube. Using a drawer edge, door frame or a small length of metal angle, extend each mark the full length of the tubes (see Figure B).

2) In this step you will build the engine mount - refer to Figure C as needed for this step. Locate the red engine tube, the yellow pusher tube, the Kevlar cord (it looks like a heavy piece of thread), the metal engine hook, the two centering rings (the larger ring shaped pieces that fit the outside of the engine tube) and the engine block (the small ring shaped piece that fits inside the engine tube). Test fit the engine tube into the centering rings. If the engine tube does not fit smoothly, you may need to sand the inside of the rings or remove a layer or two of the paper wrap from the inside of the centering ring (use your knife to loosen an edge of the paper and carefully pull it out).

Take the engine tube, and with your hobby knife, make a small horizontal slit about 1/8" wide 1 7/8" from one end of the tube. Slip the "hook" end of the metal engine hook into the slit (you can hold the hook in place with a small piece of tape) - be sure the hook is straight along and parallel to the tube. Slip one of the centering rings over the top end of the tube and down over the hook. Apply a thin layer of glue to the outside of the engine tube about 1" from the end (see Figure C, this is the location of the "First Centering Ring") and slide the centering ring down until it is in the proper location - be sure to check the alignment of the engine hook.

Take the Kevlar and tie one end firmly around the middle of the engine tube and hook as shown in Figure C. Slip the remaining centering ring over the loose end of the Kevlar and down over the end of the tube. Apply glue and slide the second ring in place as shown in Figure C.

Using a Q-Tip, piece of scrap wood, etc., apply a small amount of glue inside the top of the tube above the end of the metal hook and insert the engine block, take the yellow "pusher tube" and push the engine block into place. Remove the yellow tube and set aside. Allow the glue to dry thoroughly.

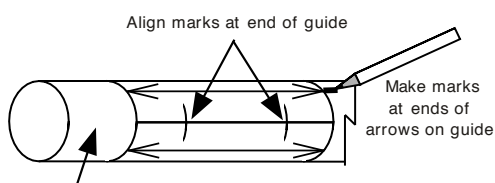


Figure A

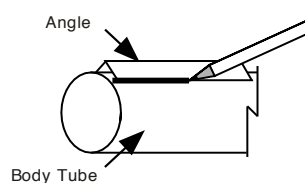


Figure B

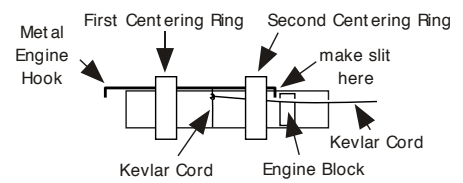


Figure C

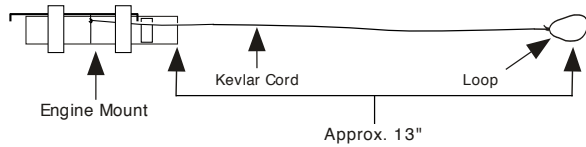


Figure D

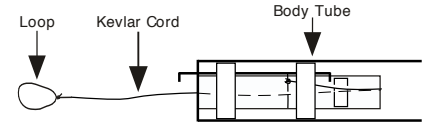


Figure E

3) Now take the yellow tube and the engine mount - you will make a loop at the loose end of the Kevlar cord. This loop should be about 13" from the top end of the engine mount - see Figure D. To make the loop, firmly tie the loose end of the Kevlar around the yellow tube at the proper length then slip the loop off the yellow tube. Trim any excess cord from the knot of needed.

4) Take the engine mount and the long white body tube and test fit the mount in the end of the tube. If needed lightly sand the outside of the centering rings if needed for a smooth, yet snug, fit. To avoid getting glue on the Kevlar cord, thread it down through the top of the Engine Mount so that the Kevlar cord hangs out the rear of the mount (see Figure E). Using a Q - Tip, scrap piece of wood, etc., apply a thin layer of glue all around the **inside** of one end of the white body tube about 1" to 2" up inside the tube. Insert the engine mount (engine block end first!) and smoothly insert into the body tube so that the bottom end of the engine tube is exactly even with the end of the body tube (the end of the metal hook will stick out of the body tube). After the glue is dry, locate the white elastic shock cord. Firmly tie the elastic cord to the Kevlar loop. Thread the shock cord and Kevlar back through the engine mount so that the cord is inside the body tube. If you have trouble threading the cords through the engine block, use a pencil, etc. to poke the cords through the mount.

5) Locate the balsa fin stock and the fin template. With your hobby knife or scissors, cut out the fin template. Using a ball point pen, trace around the template to mark the balsa sheet for the fins. Refer to Figure F to see how to lay out the fins on the balsa sheet. Pay careful attention to the balsa grain - it should follow the leading edge of the fins. Carefully cut out the fins using your knife and a metal straight edge. Take your time when cutting out the fins and try and make all the cuts as square and accurately as you can. Lay a piece of medium grit sandpaper on a flat surface. Stack the fins together and sand all edges to insure each fin is the same size. Pay special attention to the root edge of the fins to ensure that they are square.

If desired, you may round, or airfoil, the appropriate edges of the fins, this will make the fins more aerodynamic and allow you rocket to fly higher than it would if you just left the fin edges square. The root edge (which will be glued to the body tube) and the tip edge should be left square (see Figure G). Figure H shows how a simple rounded fin would look (the one on the left), and on the right is an example of an airfoiled fin.

Using medium grit sandpaper, shape each fin as desired - a sanding block is highly recommended for this. If you don't have a sanding block, lay the sandpaper down on a flat surface and move the edges of the fin against the sandpaper. Be careful not too remove to much wood at one time - roughly shape one side then turn the fin over and do the same on the other side. Continue this procedure with the medium and then fine sandpaper to further shape and smooth the fins until you are satisfied with their appearance. Repeat with extra fine sandpaper if desired.

6) You will now attach the fins to the body tube. Make a mark on each of the three fin lines 3/16" from the bottom of the body tube (the end the engine mount is glued into), also make a mark on the launch lug line 6" from the bottom of the body tube.

If you are using wood glue, use the following directions to make a "double glue joint", if you are using a different type of adhesive, please refer to "**Some Notes on Adhesives**" in the "**Tips & Info**" section of our website: <http://www.asp-rocketry.com/tips.html>.

One fin at a time, apply a very thin layer of glue to the root edge of each fin and to the body tube where the fin will be attached and allow the glue to dry. One fin at a time, apply another thin layer of glue to the root edge and firmly press the fin in place on the body tube. Note that the bottom of the root edge of each fin should be even with the 3/16" mark you made on the fin line (see Figure I). Use the fin alignment guide on page 7 to help you in aligning the fins. As the glue sets, be sure that the fin is straight out from and parallel to the tube. Repeat for the remaining fins. After the glue is completely dry, apply a small amount of glue to the joint between the root edge of the fin and the body tube. Smooth the glue with

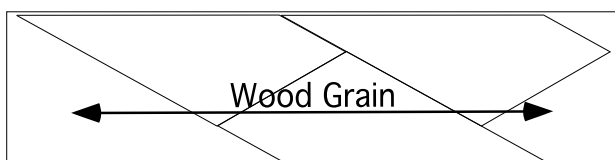


Figure F

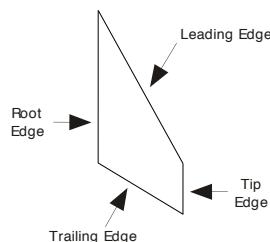


Figure G

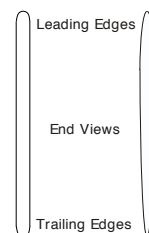


Figure H

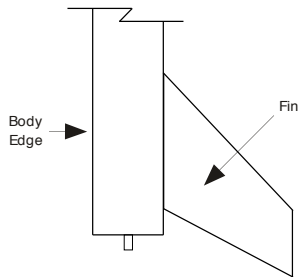


Figure I

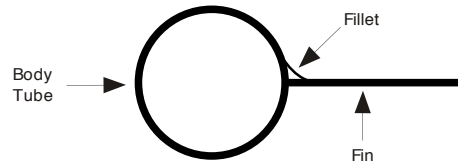


Figure J

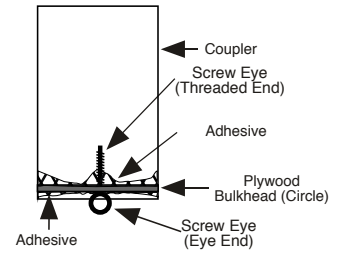


Figure K

your finger to form a small, smooth fillet and remove any excess glue (see Figure J). Allow the model to rest horizontally while the glue dries on each set of fins. The fillets will strengthen the fin attachment.

7) You will now attach the launch lug to the model. You may use either an 1/8" or 3/16" launch rod to fly your model, depending on which size rod is on your launch pad. If you think you will be flying fairly heavy payloads, a 3/16" rod would be preferable. Select the correct size lug (the lugs are the very small white tubes) and glue it on the body. The bottom edge of the lug should be at the mark you made on the launch lug line. Be sure the lug is parallel to the body tube. After the glue is dry, apply fillets to the launch lug.

If you desire, you may actually attach both lugs to the model to allow you to fly from either size launch rod, if so, glue the larger lug on first and allow to dry, then glue the smaller lug next to it.

8) See Figure K as need for this step. Locate the shorter white payload tube, the brown coupler tube (it fits inside the payload tube), the flat plywood bulkhead (circle), and the metal screw eye. Thread the screw eye into the hole in the plywood bulkhead. Check the fit of the plywood circle into one end of the coupler - sand if too tight, but be sure that it is a snug fit. Remove the ply bulkhead from the coupler and then remove the screw eye and put some glue into the hole. Thread the screw eye back into the hole.

Apply a generous amount of adhesive about an 1/8" up inside one end of the coupler. Insert the bulkhead as shown in the drawing so that it is about 1/8" up inside the tube (with the eye end of the screw eye sticking out). Be sure that the piece is up in the coupler evenly and not sitting at an angle. Allow to stand upright while the glue dries. After it is dry, apply a generous fillet of glue inside the coupler and over the screw eye to hold it and the plywood circle firmly in place. After the glue has cured, turn the coupler over and apply another generous amount of glue on the other side of the plywood circle and allow to dry.

9) Apply a layer of glue up inside one end of the payload tube and insert the coupler so that it goes in about half-way (and about 1" is left exposed) - see Figure L. Test fit the shoulder of the nose cone into the open end of the payload tube - sand the shoulder if needed for a snug fit. Be sure the cone is tight enough not to come loose during flight - you can wrap tape around the shoulder to make a snug fit if needed. Firmly tie the loose end of the elastic shock cord to the screw eye.

10) Locate the bag with the parachute materials. Lay the canopy on a smooth, hard, flat surface. Fold the canopy in half and then in half again, and in half one more time - this will allow you to find the center of the canopy - the center will be at the point created by the folds (See Figure M). With your felt tip marker, make a small mark at this point. Unfold the canopy with the center mark up and smooth out the canopy.

11) Refer to Figure N as needed for this step. Locate the shroud line material. Even the ends of the pieces and fold the lines in half. Mark the center point of the lines with a felt tip marker. Take one of the shroud lines and lay it on the canopy - the center mark on the shroud line should be at the center mark on the canopy, the ends of the line should extend over two opposite points of the canopy. Take one of the adhesive circles and place it (adhesive side down) over the shroud line as close as possible to the edge of one of the points of the canopy. Place another circle over the shroud line at the point on the opposite side of the canopy. Place a third across the line about one inch from the center mark and press firmly in place. Take another circle and place on top of the line one inch from the center mark on the opposite side of the third circle. Repeat with each of the remaining lines so that the top of the canopy appears as in Figure O. Press down firmly on all the tape strips to be sure that they are well attached to the canopy and shroud lines.

12) This step is not required, but is highly recommended. With CA glue, apply a **small** amount of glue to the center and top edge of the circles at the canopy corners (see Figure P) - **do not** apply glue anywhere else! Be sure you use an extender tip for the glue to apply as small an amount of CA as possible. Keep a paper towel or rag handy to quickly wick away any excess glue. **Be very careful** not to get any CA on the canopy or the shroud lines other than as indicated! After you have applied CA to all the strips, allow the glue to cure completely before you move on to the next step. This will prevent the canopy from "creeping" up the shroud lines.

13) With one hand, pick up the parachute by the top center of the canopy. With your other hand, gather together the shroud lines. Pull down on the lines so that the points of the canopy are all even (see Figure Q). Tie a knot about two to three inches from the bottom of the lines. Thread the ends of the lines through the eyelet of the snap swivel (moisten the

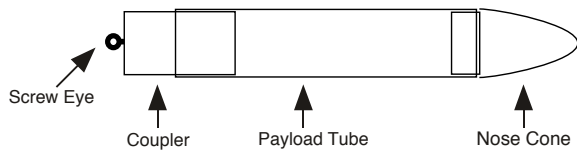


Figure L

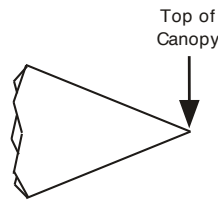


Figure M

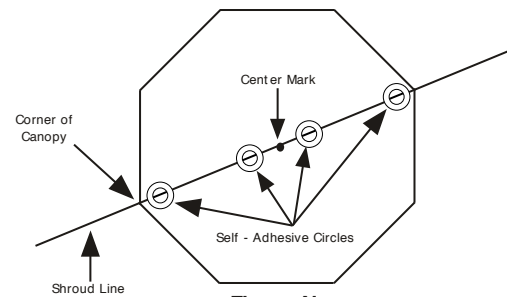


Figure N

lines if needed) and tie firmly. Apply a small amount of white or aliphatic resin glue to the knot and allow to dry. Trim any excess line from the knot. Attach the parachute to the rocket by attaching the snap swivel to the screw eye at the bottom of the payload section.

Finishing/ Decorating

- the model may be decorated and/or painted in many ways, depending on how you want it to look and how much time you wish to put into it. The following instructions refer to a full finishing of the model including filling the wood grain. Be sure to do all balsa filling, painting, etc. in a well ventilated area. Alternately you may simply decorate the model with any colors of felt tip markers, decals/ stickers, etc. If you decide not to fully finish the model as described below, skip on to the Flight Preparation and Launching section.

14) Prior to beginning this step, be sure to read any instructions on the brand of sanding sealer you are using - follow the manufacturers directions if they vary from those below. Be sure to use the thinner recommended by the manufacturer to clean your brush. Using fine sandpaper (then extra fine, if desired) go over all the wood parts to ensure they are smooth. If there are any dents or "dings" in any of the wood parts, apply one of the recommended filler materials to the area and allow to dry. Sand the area until smooth and repeat if necessary. Wrap a single layer of scotch tape (or masking tape) around the shoulder of the nose cone (the part that goes into the body tube) - this will prevent building up the thickness of the shoulder while painting. Insert the nose cone shoulder into the top of the body tube. Next apply a coat of sanding sealer to all wood parts (the nose cone and fins)- it is not necessary to seal the nose cone shoulder. Allow the sealer to dry then apply a second coat. After the second coat is dry, sand with medium or fine sandpaper until the surfaces are smooth. Continue with single coats of sealer, sanding in between each coat, as needed until the wood grain is completely filled and the surface is smooth.

15) You will need to use something such as a dowel or a section of newspaper rolled into a tight cone inserted into the base of your model to hold it while painting. If desired, lightly go over the model with a tack cloth to remove any excess dust or other particles which could mar the finish. It is a good idea to do this before applying each coat of primer and paint. Be sure to read the instructions on the brand of paint you are using - follow the manufacturers directions carefully. Be sure **not** to mix different types or brands of paint without testing. It is recommended (but not absolutely necessary) that you apply one or more coats of primer before the color coats of paint - this will give a much smoother surface to your model and allow the paint to adhere better. If using primer, sand with fine and/ or extra fine sandpaper after each coat is completely dry. Use as many coats as needed to get a smooth finish before proceeding to the color coats. Next give a base coat of the lightest color you will be using on the model - several light coats are preferable to one or two heavy coats (this will be true for **all** the colors you will be using). Apply as many coats as needed to get an even color and allow to dry.

16) If applying other colors, use masking tape to cover up the areas of the model you do not wish to paint with the second color. Apply the second color as you did the first and allow to dry. Continue this process if other colors are desired. After the paint has dried carefully remove the masking.

17) At this time you may apply any decals, stickers, trim tape, etc. if desired. The included decals are self-adhesive. Cut out as desired and remove the backing to apply to the model. To protect the paint and other decorations, apply one or more coats of clear paint (such as Krylon Crystal Clear or similar) and allow to dry.

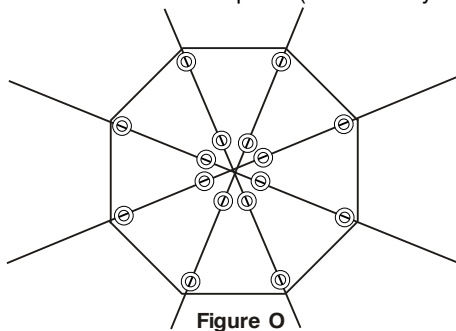


Figure O

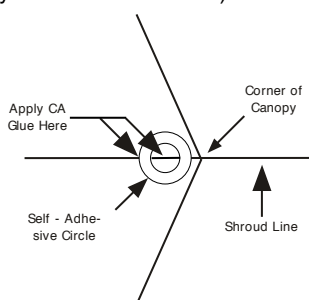


Figure P

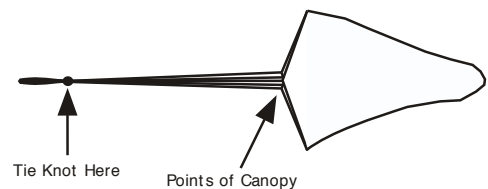


Figure Q

Flight Preparation & Launching

Remove the payload section and parachute from the body tube and loosely insert some flame - proof recovery wadding (such as that made by Quest or Estes) into the top of the lower body tube. Use enough wadding to fill the tube to a depth of at least two body diameters. Use a pencil or dowel to lightly tamp the wadding down towards the top of the engine mount.

There are many ways to pack a parachute – you may pack the parachute according to the following directions (or use any method that you feel comfortable with). First evenly and completely dust the canopy with talcum (“baby”) powder – this will help prevent the canopy from sticking to itself, especially in humid conditions. Hold the parachute by the top of the canopy and the ends of the shroud lines until the canopy of the parachute is formed into a spike. Fold the canopy in half vertically then roll into a cylinder small enough to fit easily into the body. Wrap the shroud lines around the parachute.

Insert the shock cord then the parachute into the body tube - be sure the parachute slides in easily, repack it if it does not. Slide the payload section into the body tube. Be sure to check the fit of the coupler - if too tight, sand the shoulder down - if too loose, wrap with tape. The payload section should be loose enough to slip out easily, but tight enough so that you can turn the model upside down without it falling out.

Select an engine from the list of recommended engines. Note that the length of the metal hook is designed to allow the use of the longer Estes E motors, if flying with a 24mm C11 or D12, first insert the green spacer tube ahead of the engine then slip the engine into the rear of the engine tube (be sure the nozzle end is facing out!) until the metal hook holds the engine in place. Insert the igniter according to the manufacturers directions.

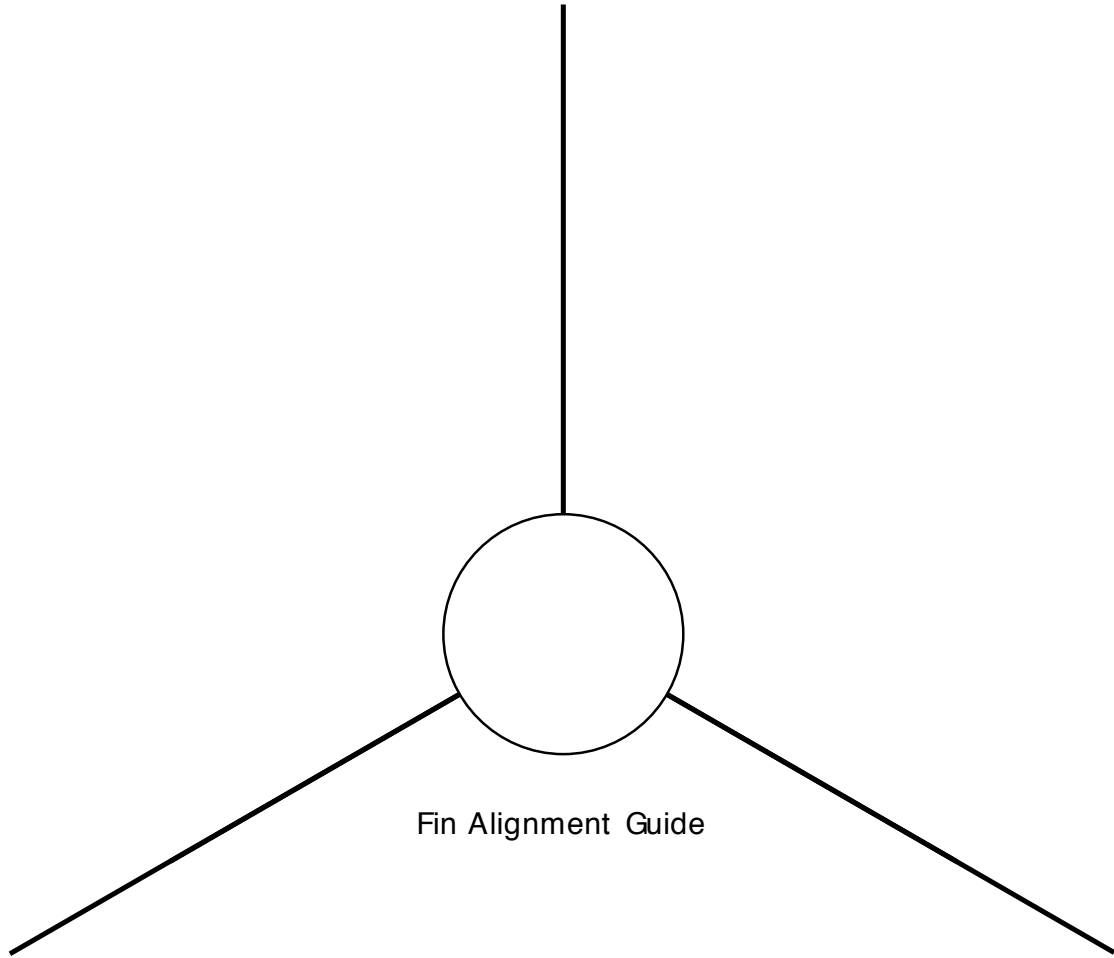
When built according to these directions, the model should be very stable, but be sure to check the center of gravity (see “About the Sky-Ferry”) - add weight to the payload section if needed to bring the CG forward.

Place the rocket on the launcher by sliding the launch lugs over the launch rod. Attach the micro - clips to the igniter. Move back to a safe distance & be sure the launch area is clear. Check for low - flying aircraft, give the countdown & launch!

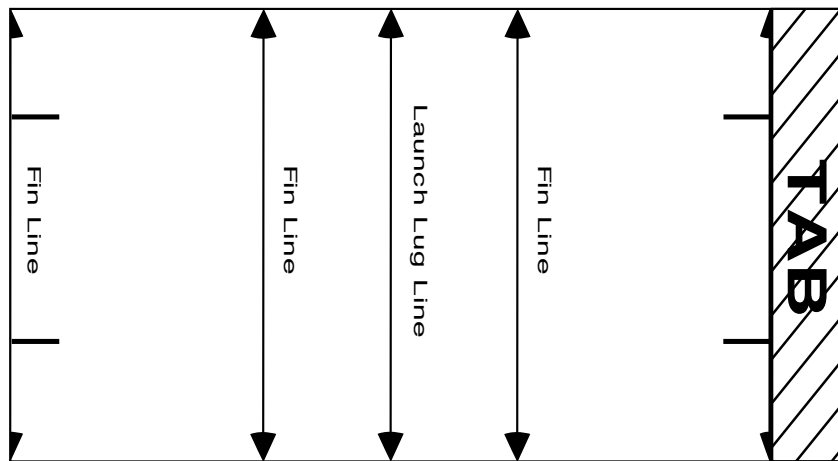
Be sure to read & follow the NAR Safety Code before flying this or any other model rocket!

(Note: the NAR Safety Code is normally included with each package of Model Rocket Engines)

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Fin Alignment Guide



Tube Marking Guide