Thrustline Aerospace
WWW.THRUSTAERO.COM

Thank you for purchasing a Thrustline original kit. Please read the entire instruction booklet before starting. Inventory all of your parts before you begin and understand where each part will be used and when. There are many "like" pieces in this kit so make sure you study them and know where they are used. If you have any questions or concerns about the building or flying of this kit, please feel free to e-mail me at rocketman1959@netzero.com. Remember; always fly your rocket under the NAR guidelines and safety code. For more information on the NAR, go to their website www.nar.org Thanks to all the members of TRF for their continued support especially Chan Stevens, John McClure and Phred Talasco!

Parts List

1.....Nose Cone BNC55HJ (1)
2.....Nose Cone BNC5-W (3)
3.....Coupler Tube CPL55 X 2" (1)
4.....Body Tube BT5 5-3/8 (3)
5.....Body Tube BT20 4-3/4 (3)
6.....Body Tube BT55 12-1/4 (2)
7.....Body Tube BT70 8-3/8 (1)
8.....Engine Tube BT50 X 3.75" (1)
9.....Engine Clip retaining Collar BT50 X 2" (1)
10...Engine Hook (1)
11...Engine adapter Kit D/E (1 kit)
12...Centering Rings CR520 (6) Plywood
13...Centering Rings CR5055 (2) Fiber
14...Centering Rings CR2055 (2) Fiber
15...Centering Rings CR5570 (2) Plywood
16...Thrust Ring CR2050P (1)
17...Fin Stock (Laser cut fin set) (1)
18...Fin Stock (Laser cut fin set) (1)
19...Launch Lug 3/16"x 8 3/8 (1)
20...Steel Eyelet (1)
21...Kevlar Cord .035 X14" (1)
22...Elastic Shock Cord ¼ X 38"
23...Chute Kit 20" (1 kit)
24...Decal Sheet (Not Shown) (1)
25...Instructions including extra patterns and fin guides (Not shown) (1 set)


Parts Sheet 1 of 2
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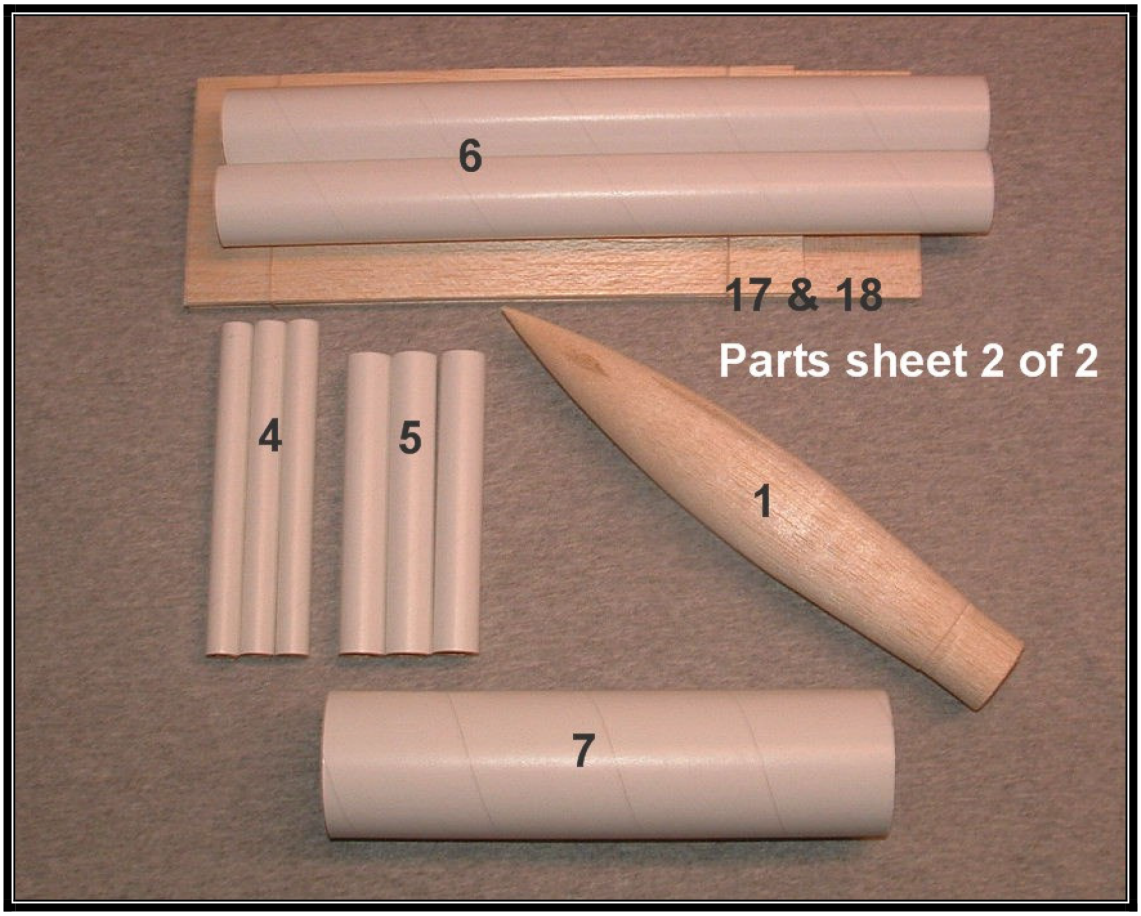
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Parts sheet 2 of 2
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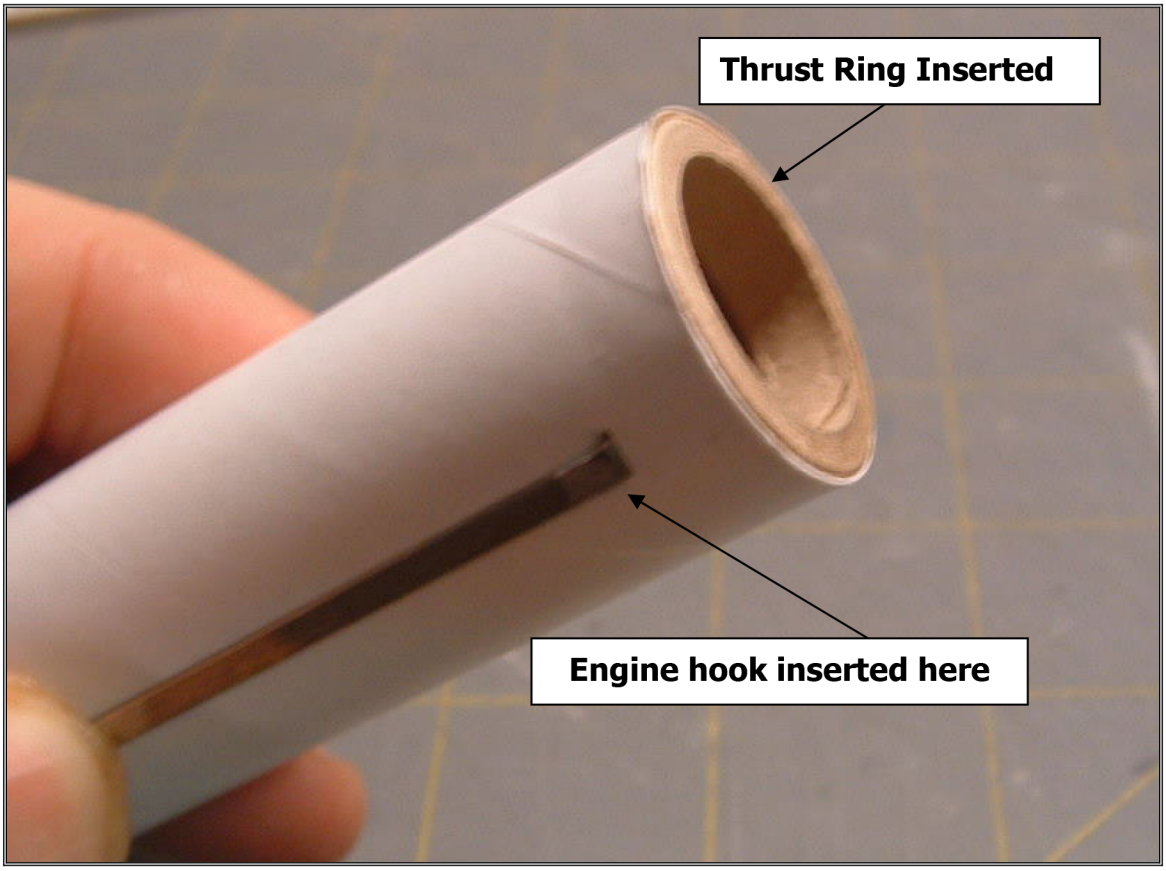
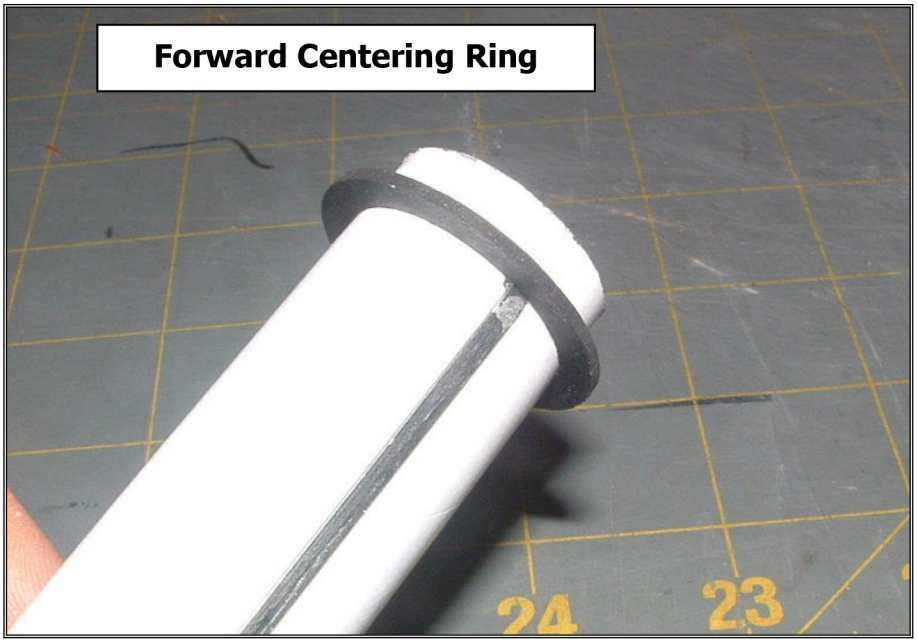
These instructions are somewhat sectional in nature. Even if you have read through the entire booklet, read again the section you are about to execute, *before* you accomplish it.
You are just some of the items needed to complete this kit:
-Saran Wrap or Wax Paper
-Pins
-Thin CA
-Scissors
-Masking Tape
-Xacto Knife
-Sandpaper 100,200 and 400 grits
-Steel Ruler or Straight Edge
-Paints
-Launch Supplies

Engine Mount Assembly

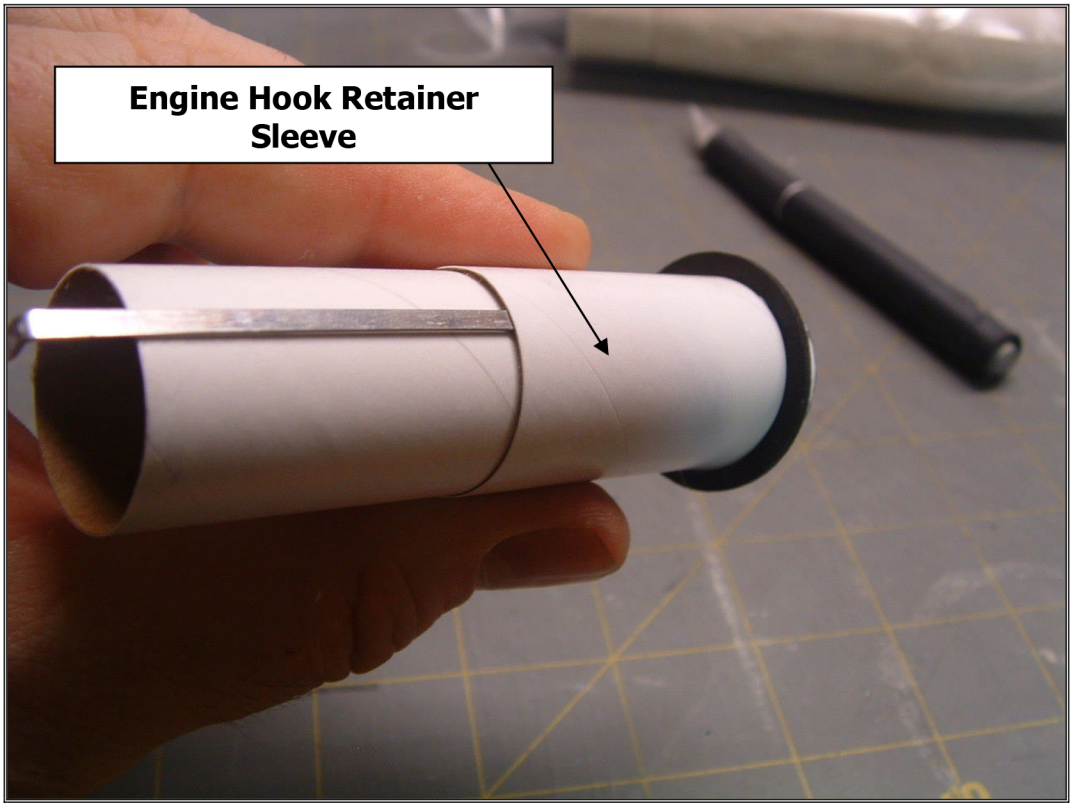
1- Glue engine thrust ring so that it is flush with the end of the engine tube.
2- Make a ¼ inch slit just forward of the installed thrust ring and insert engine hook as shown below.



3- Glue forward centering ring against engine hook as shown in next photo.



4- Coat the engine hook area of the engine tube with glue and slide the 2 inch engine retainer sleeve into place so that it butts up against the forward centering ring. See photo.



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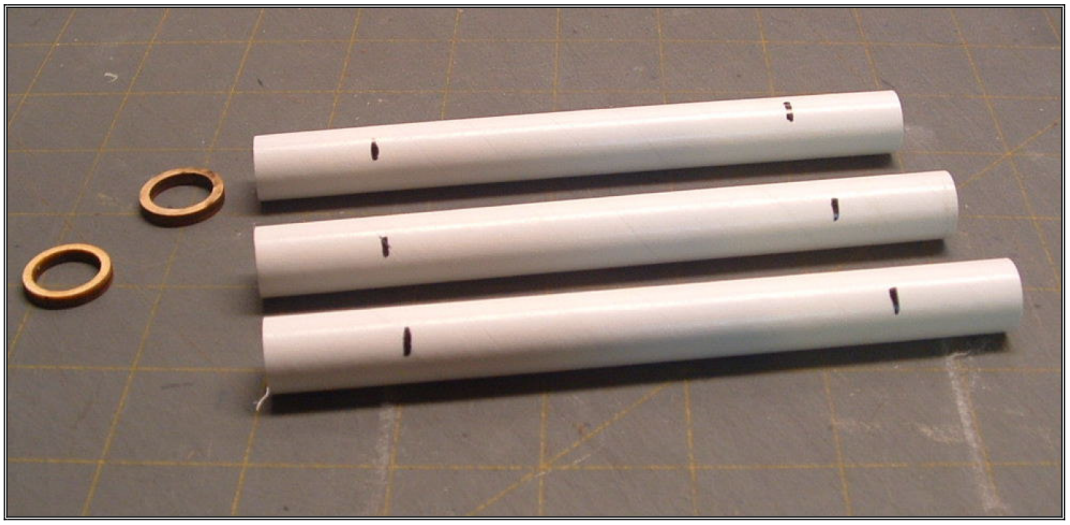
4- Glue the aft centering ring into place as shown. You may want to make a small notch on the inside of this ring to help it slide over the engine hook. Make sure the ring rests up against the engine hook retainer sleeve you installed in the last step. Let this assembly dry.

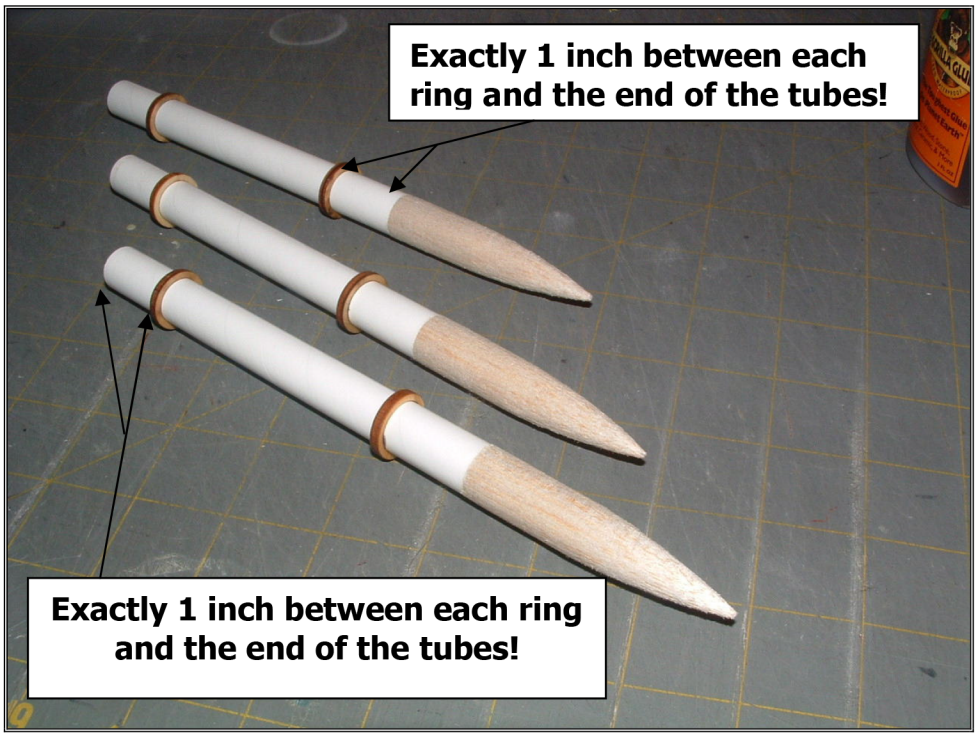
Pod Sub-Assembly

1- Locate the three, SMALL pod tubes. Make a mark 1 inch form each end. Do this with all three tubes. (There are small pod tubes and large pod tubes. Be sure to choose the correct size for these steps.)

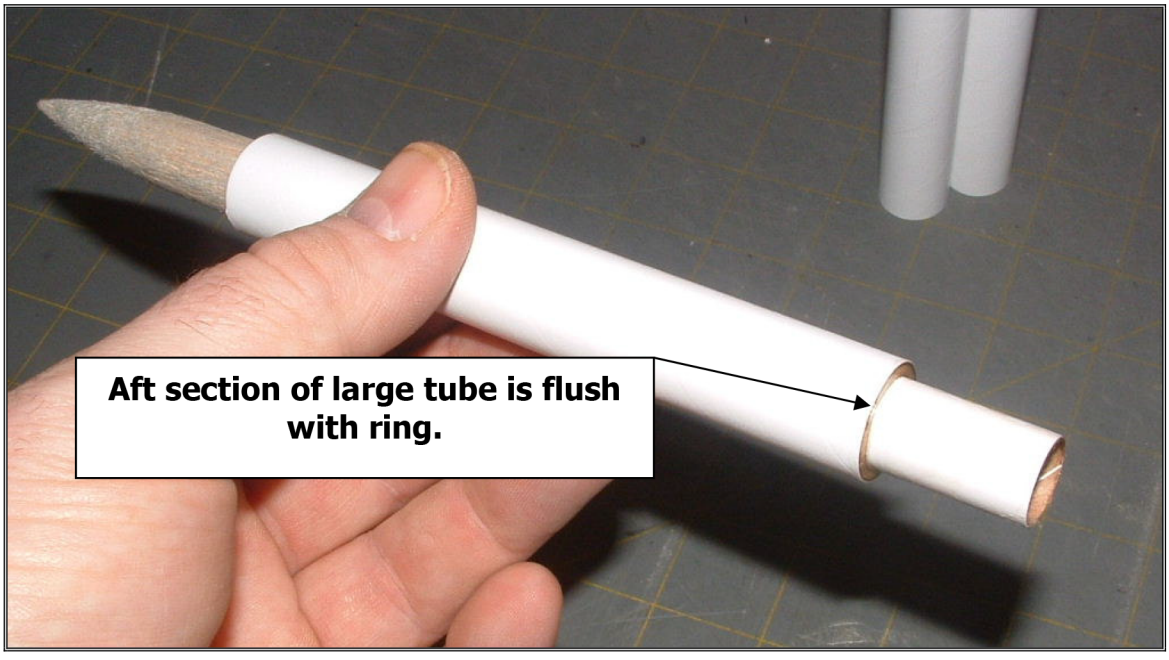


2- Glue a small pod tube ring at each of these marks. There should be exactly 1 inch between the end of each tube and each ring. Do this at each end of each of the three tubes.

2a- Glue the 3 small nose cones into the end of each of the pod tubes.



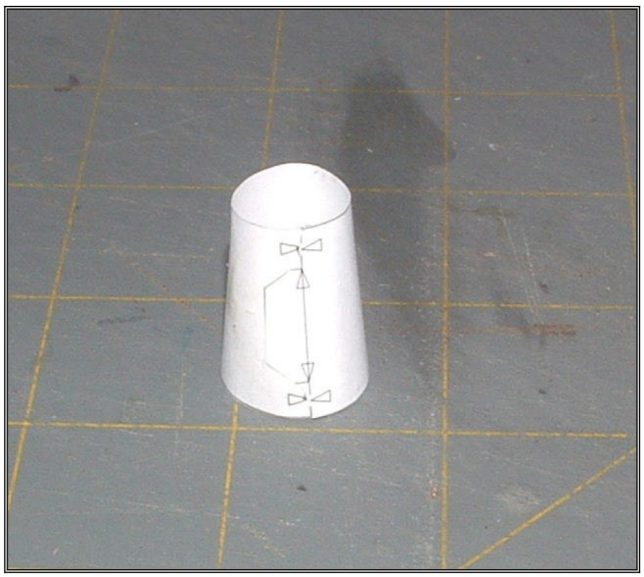
3- Locate the three LARGE pod tubes. Glue them in place over the smaller pod tubes so that the aft ring is even with the end of the larger tube as shown in the photo below. Do this with all three tubes. This will leave a space around nose cone on the front.



4- Cut out the three aft pod shroud patterns. Cut them slightly larger than the black line, you can always trim a little off later. I have included a few extra spare patterns for practice.

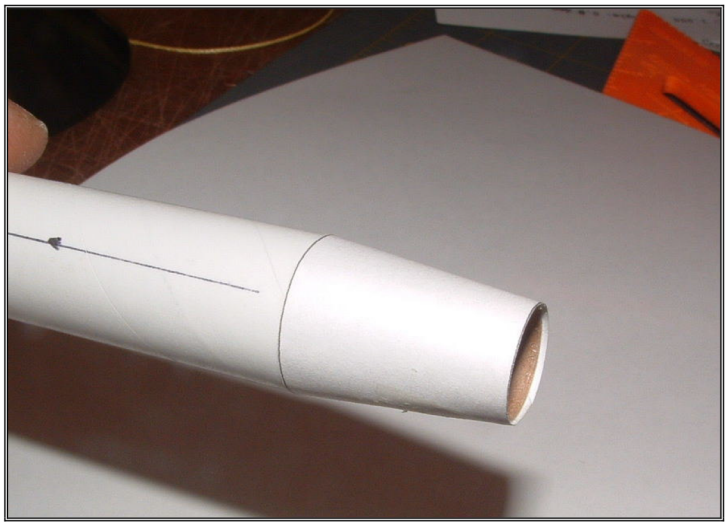
4a- Take one of the cut-out shrouds and roll them gently over a pencil or similar round object. This will give them some curve "memory" making it easier to glue the ends together.

5- Using glue sparingly, glue the ends of the shroud being careful to use the alignment marks. Set aside to dry.



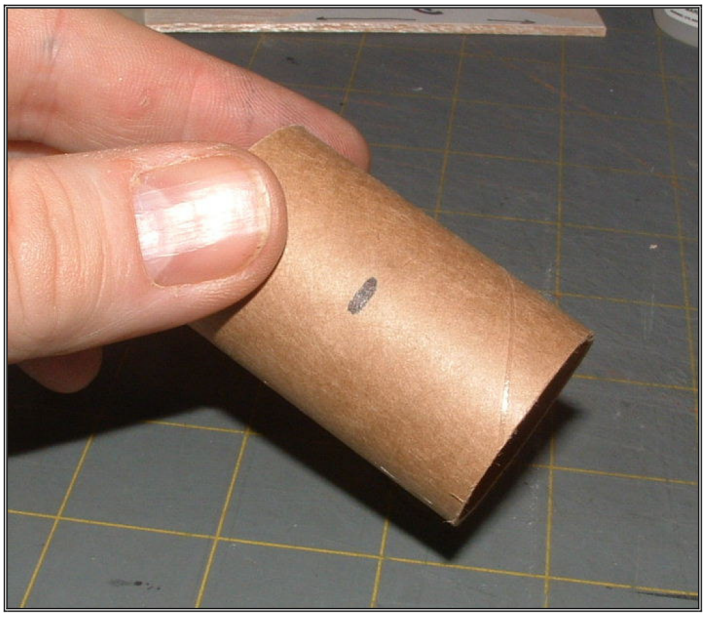
6- After the shrouds are dry, test fit them over the aft pod area. Glue into place when you're satisfied with the fit. If there is a little that hangs over the end, you can always trim or sand it off once the glue dries. Repeat for all three pods.

6a. Now, you have to stiffen the paper shrouds. Do this by applying a thinned coat of yellow glue, or paint them with thin CA glue. Again, be careful and be sure to take all precautions when applying any adhesive. When dried, they will be much stiffer and stronger.

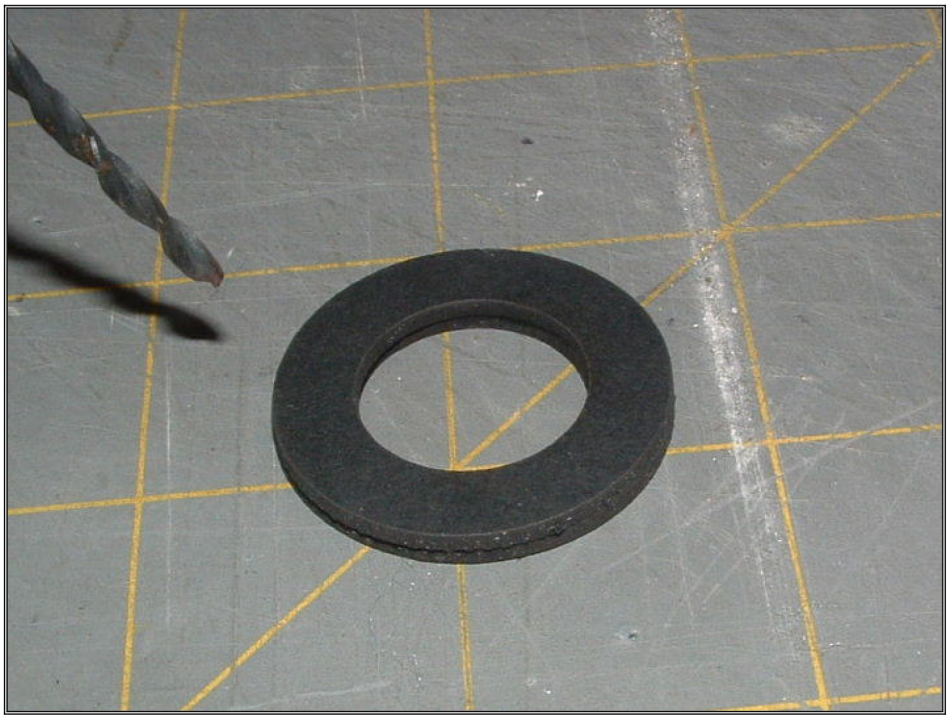


Joining the main tube…

1- Locate the 2 inch coupler from the inventory and make a mark in the middle of it.



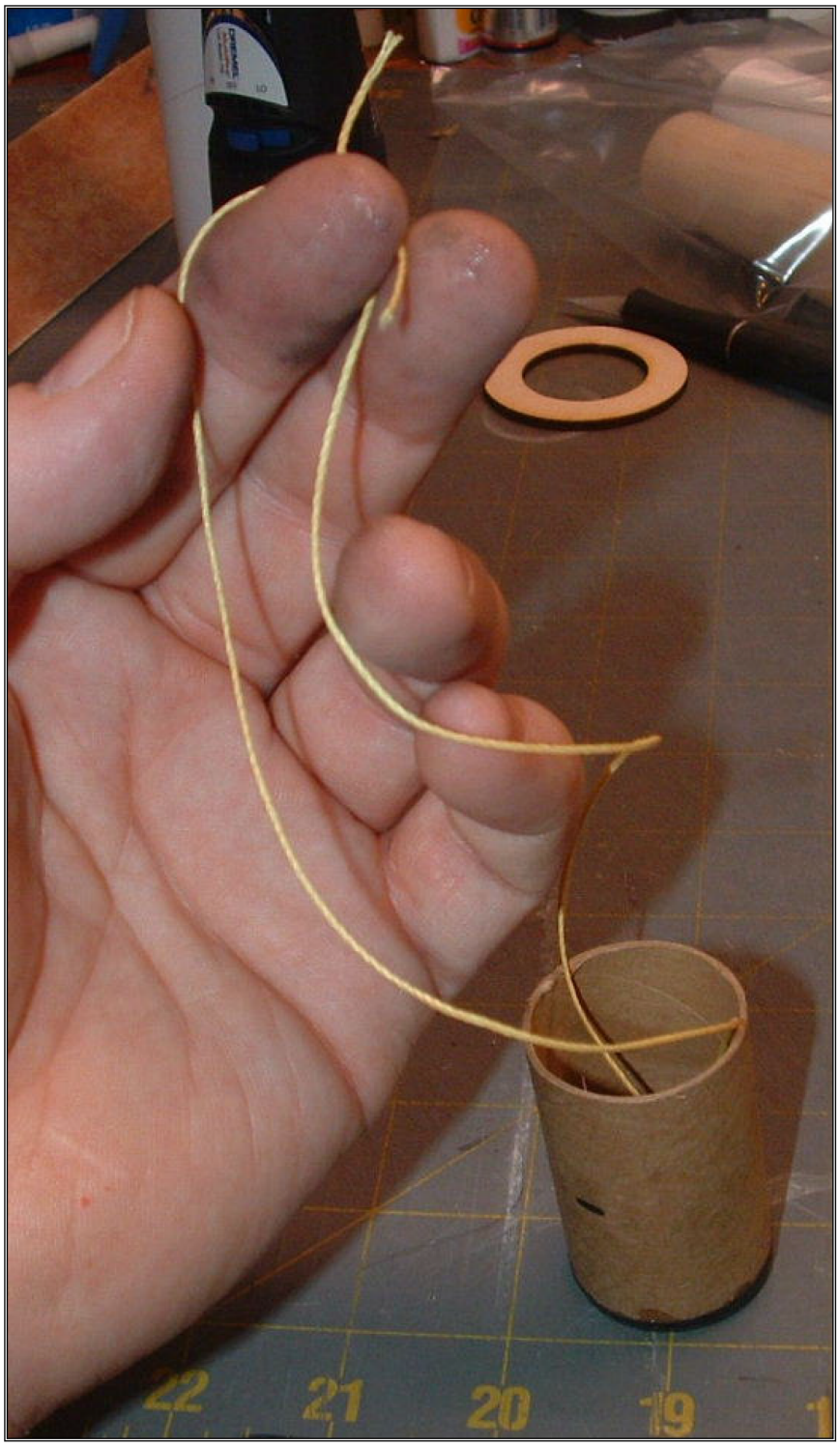
2- Locate the 2 black coupler rings and glue them together, one on top of the other.
3-When dry, drill two 1/16th inch holes, ¼ inch or so apart, through the ring "sandwich".



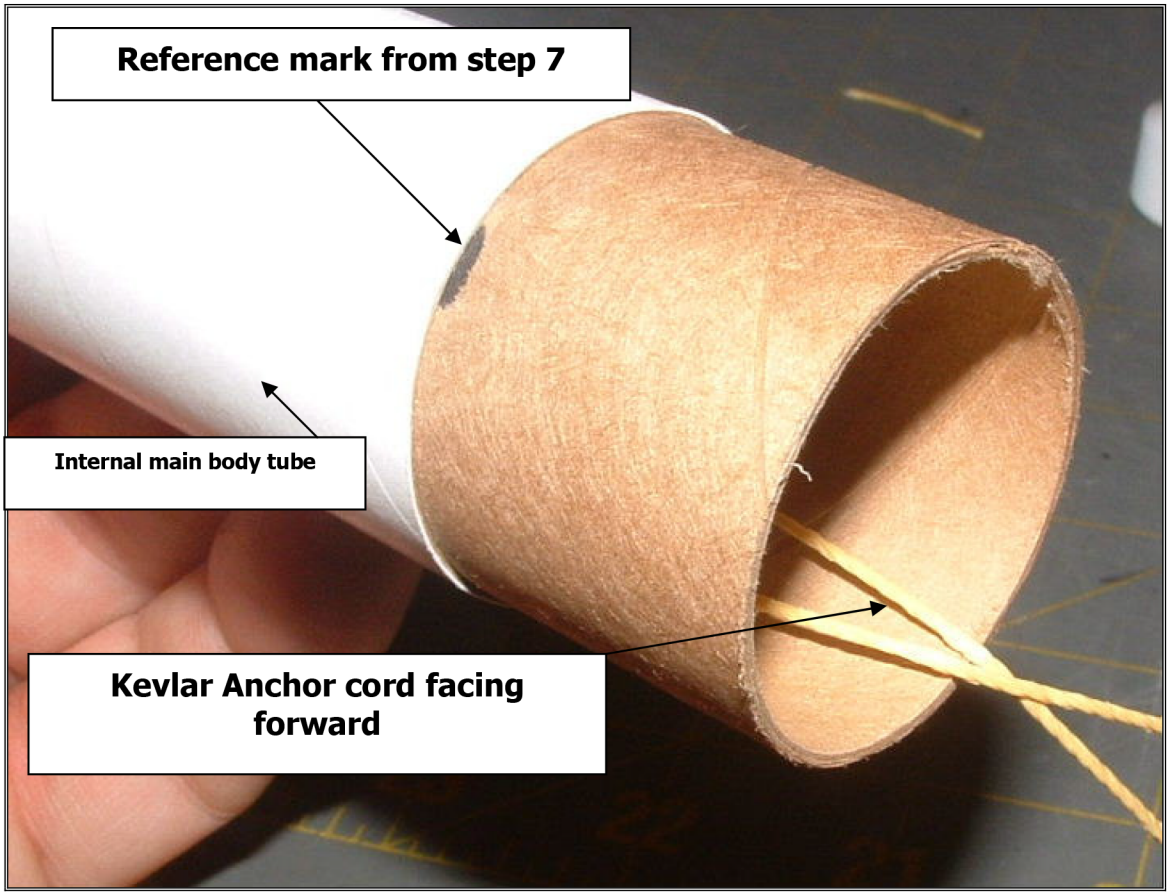
4- Glue this ring assembly to one end of the coupler.

5- Pass the Kevlar thread through the two holes and tie off together so that it forms a loop. The knot should be on the opposite end from the rings. I use a square knot and then put one very small dab of thin CA glue to hold the knot. Test it to make sure it won't slip.

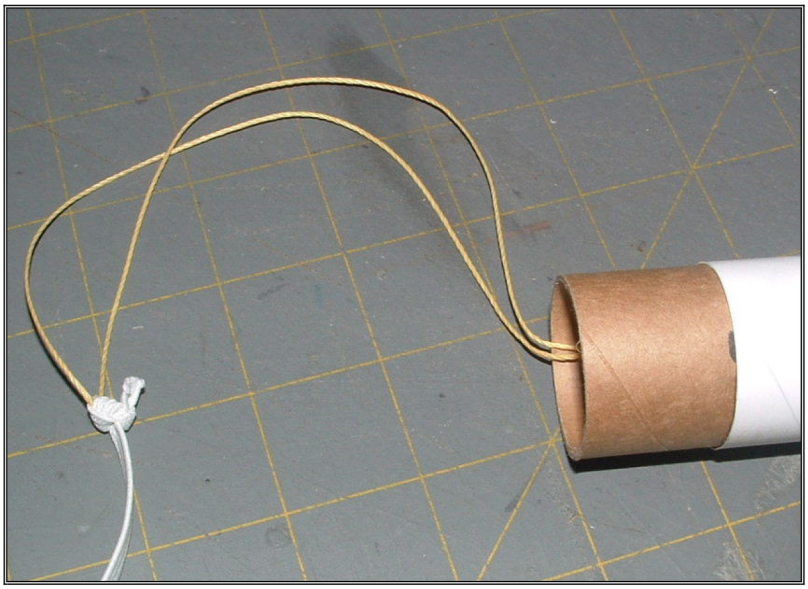
6- Notice which end the loop comes out? See the next photo for clarification.) That will be the forward end. The other end (the end with the centering rings.) will face the motor mount. Put a dab of glue on the two holes that the Kevlar is threaded through and hold the cord in this position with a rubber band as it dries.



7- When the ring and the thread on the coupler have thoroughly dried, glue coupler into one of the main (internal) body tubes ring side inserted first. (See next photo). The coupler should be half way in so that it rests on the mark that you made back at step #7 in this section. Again, notice the where the Kevlar loop protrudes.



8- When the coupler has had a chance to dry, tie the shock cord to the Kevlar cord. Some modelers feel that putting a dab of glue on the elastic shock cord knot may make it brittle over time. I use a small drop of yellow glue when it involves *this type of* knot. If you choose to do the same, use the glue sparingly.



9- Now, thread the shock cord back through the opposite end of the tube. (You can pull it back through after the tube sections are joined) This will eventually be where the motor mount is installed but we'll do that a little later.

10- When you are sure the coupler is dry, glue the other tube onto the coupler making sure the final assembly is straight, and that there is no gap between the two when joined. Set this aside to dry.

Motor Mount Installation…

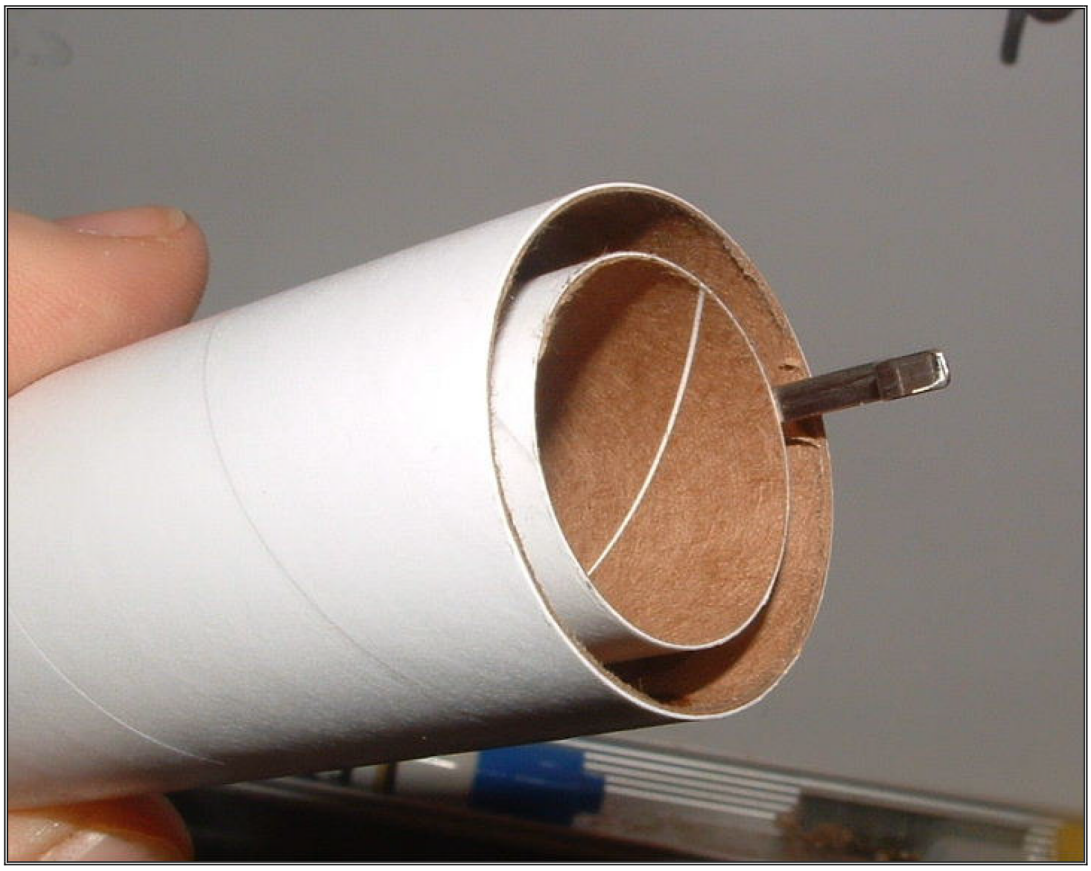
1- Remember that shock cord you threaded back through the aft end of the body tube in the last steps*?*

Well, now thread it back to the front.

2- Now let's review for a moment so that we're sure of the orientation of this tube. When you install the motor mount, you will be installing into the end that is closest to the actual Kevlar anchor point. (The two centering rings you glued onto the coupler). If you have been following closely, you just finished threading the shock cord back through the front to help with the motor mount installation.

3. Okay, now that we have the shock cord out of the way, glue the motor mount into place so that the motor tube is even with the aft body tube. See the next photo for clarification. TIP> *For a little extra strength, you can treat the motor and body tube ends with a little thin CA to harden them.* Be sure to read instructions and warnings on any glue! Set assembly aside to dry.

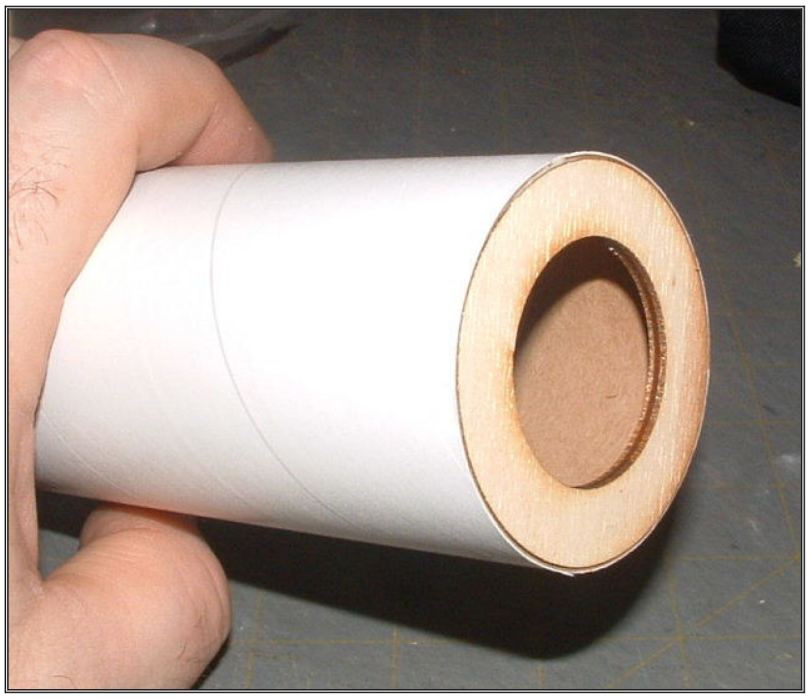
See Next Photo for clarification.



Getting the big tube ready…

Locate the large body tube (external) from the inventory)

1- Glue a large plywood centering ring into each end of the large external body tube. Take care that they are both straight ***and*** flush to the ends.



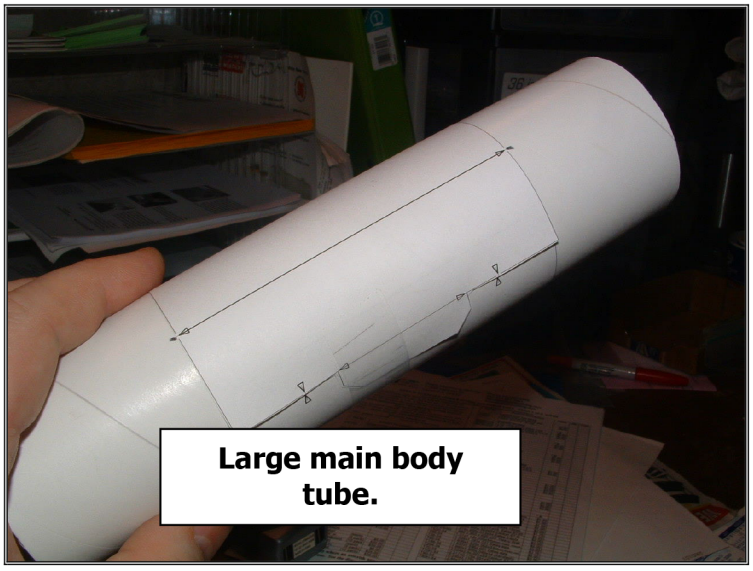
Marking all of the tubes…

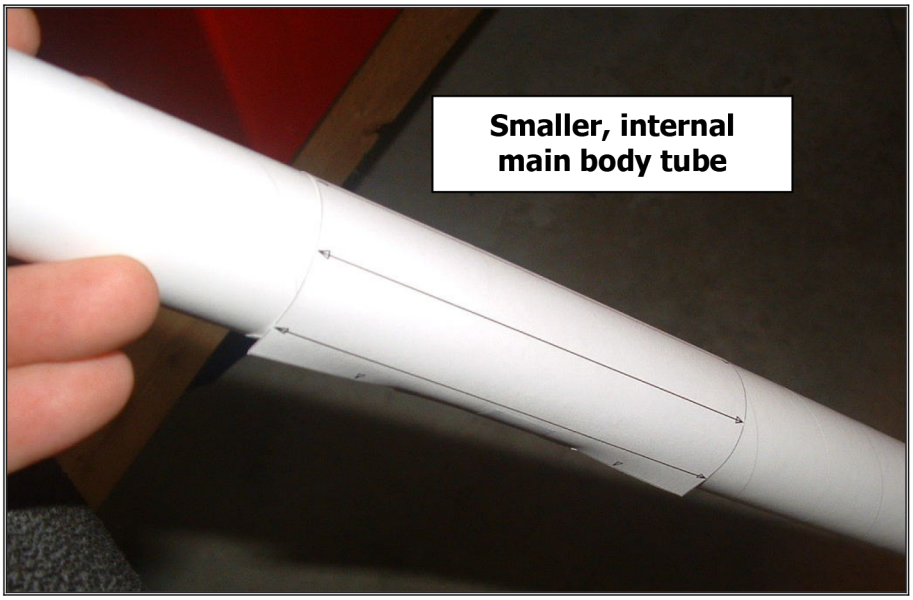
1- Time to get out those scissors! Cut out all of the fin wrap patterns. Here is a list of wraps and what you should expect to mark.

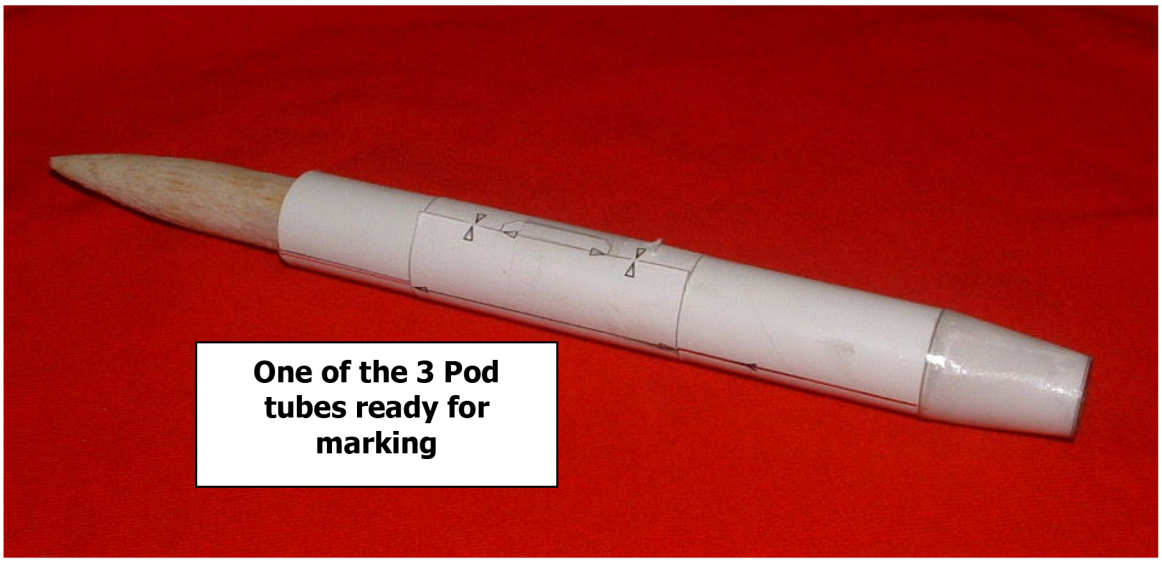
- One wrap for the large external tube. This will be used to mark the 3 main fin lines and one launch lug line (The launch lug line also determines the "bottom" of the rocket for decal purposes)
- One wrap for the smaller internal body tube. This will be used to mark 6 symmetric lines, end to end.
- Three wraps, one for each of the three pods. Each wrap is used to mark reference lines for the inboard and out board fins. (2 lines each)

You should end up with fin 5 wraps in all. I did include spare wraps for the pods…just in case!

2- Okay now that you have all of your wraps cut out and ready to go, attach them to the internal and external boy tubes and all of your pod tubes. Take care matching up all of the alignment marks. See the following three photos…







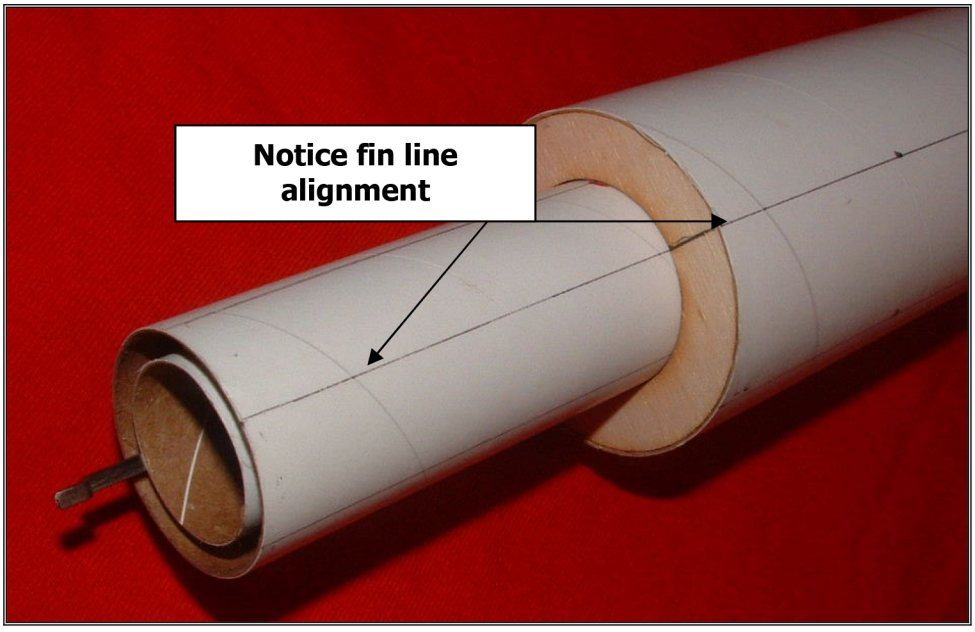
4- Using whatever method you are used to; connect all of your marks by drawing them the entire length of each and every tube. You should end up with five tubes, with alignment marks that go from one end of each tube to the other. The smaller internal body tube assembly should have six lines, the large external body tube 4 lines (one is a launch lug line) and the small pod tubes should all have two lines each.

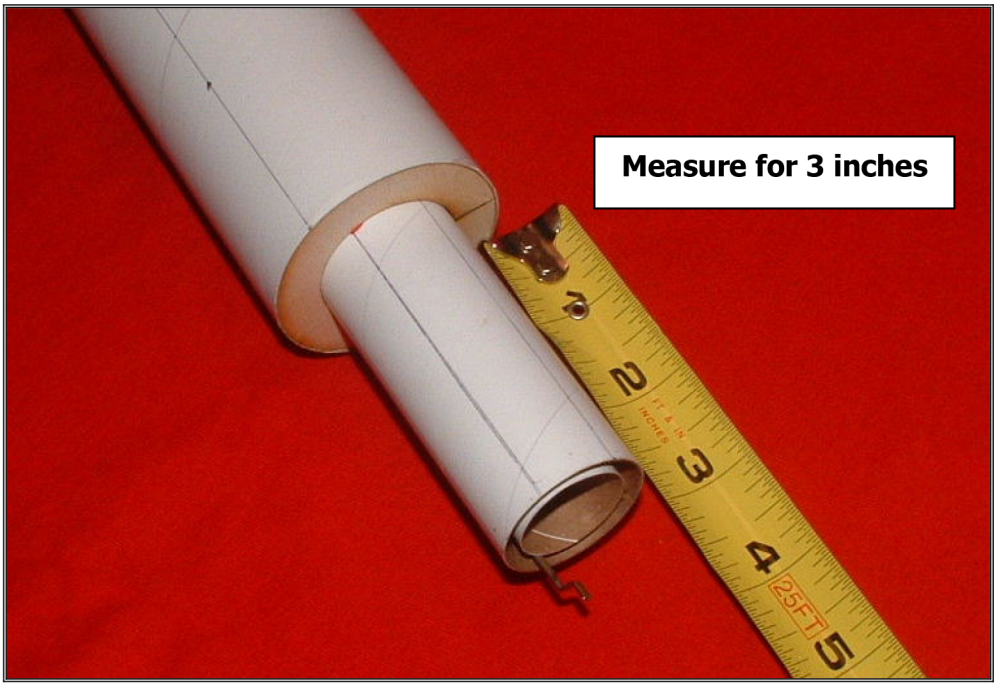
Installing the external tube…

1- Make a mark exactly 3 inches from the aft end of the internal (small) body tube assembly.

2- *PLEASE* READ THIS ENTIRE SECTION BEFORE YOU PROCEED!

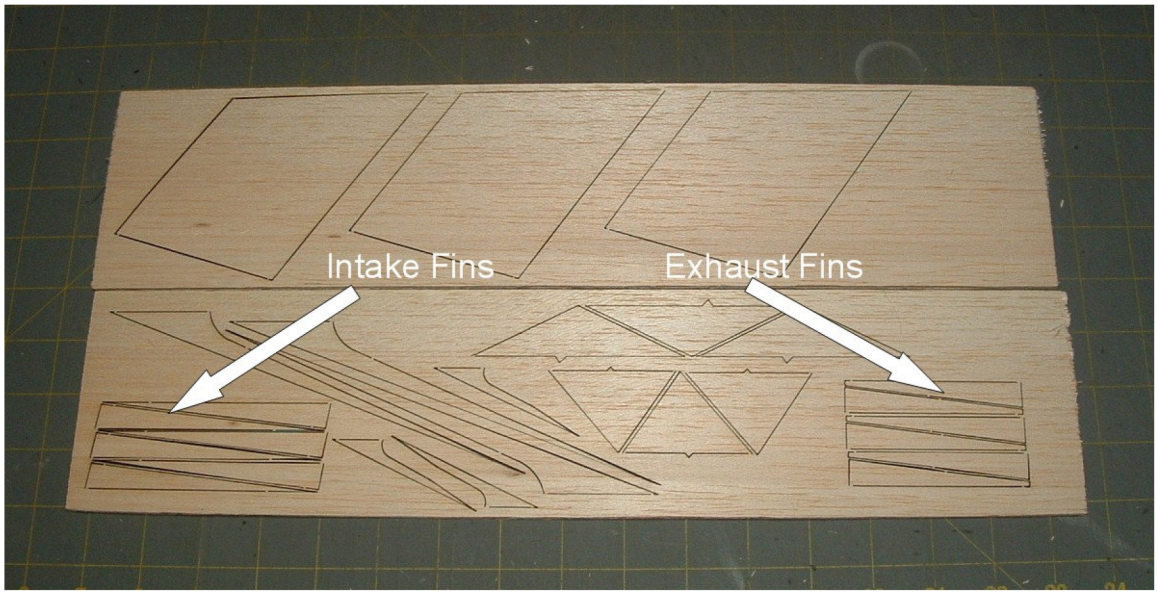
Slide the large body tube ever the smaller body tube and glue into place so that it rests on the mark you made in step 1 of this section. Also make sure that the three fin lines on the outer, large tube line up with three of the lines on the smaller, internal body tube. This will insure proper alignment of the fins. Measure to make sure this tube is exactly three inches from the aft end. (This will help insure proper fit of the exhaust cooling fins). Set aside to dry.





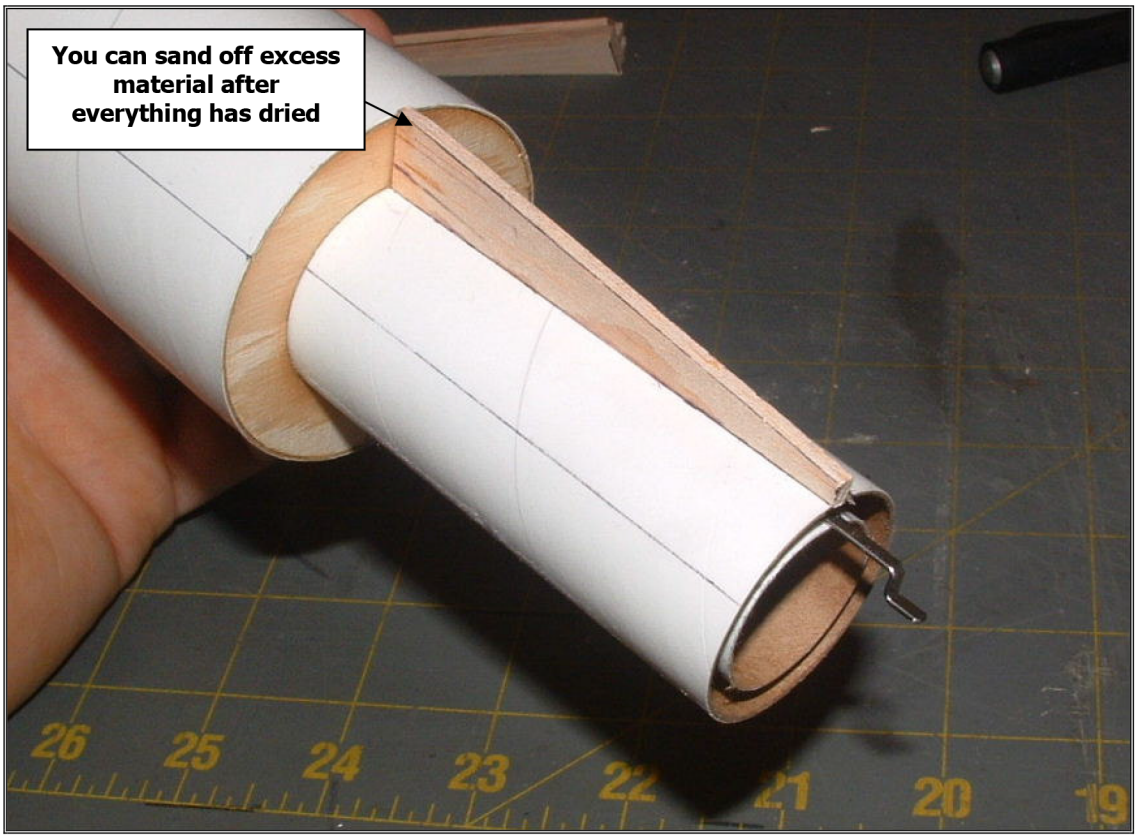
Exhaust and Intake Fins…

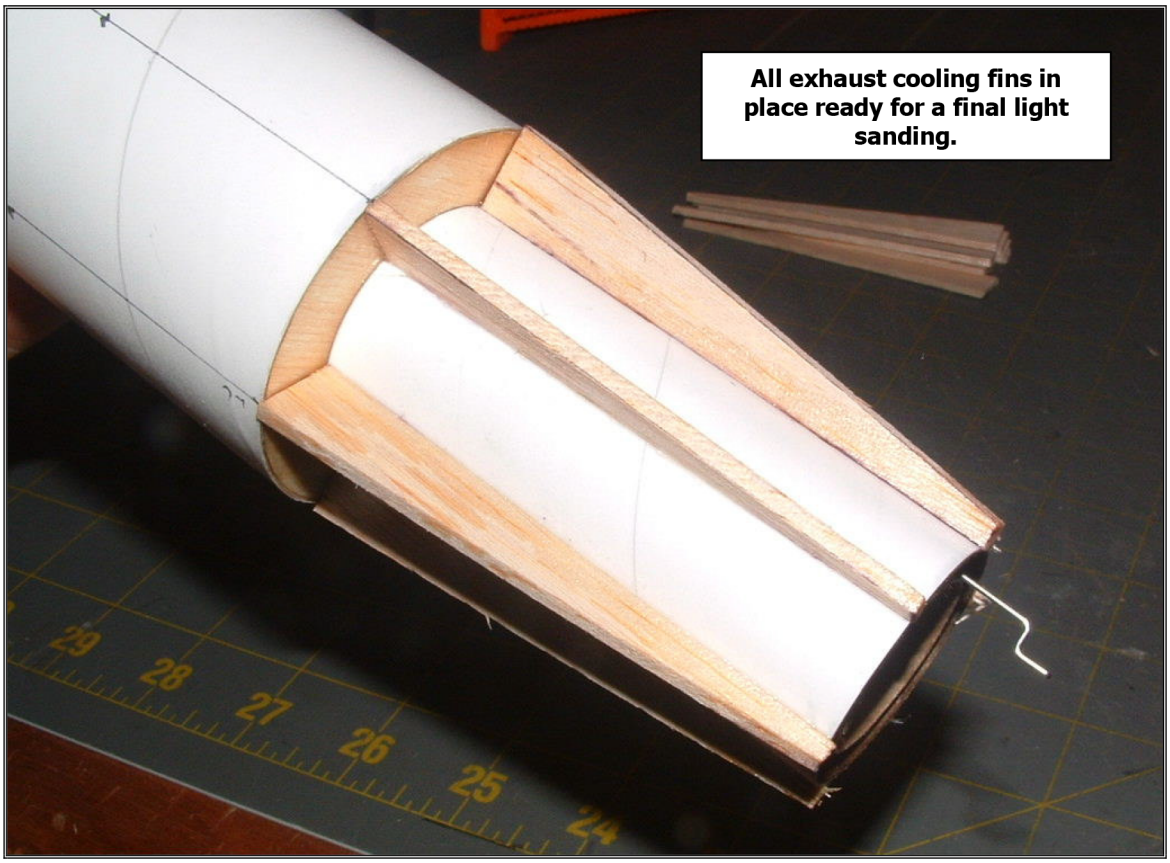
1- Locate the laser cut sheet and remove the intake and exhaust cooling fins. You can distinguish the two by looking at the ends of the fins. The forward cooling fins have a very fine point and are longer. The exhaust fins have more of a blunt end where in narrows. See Photo.



2- Starting with the aft cooling fins, begin gluing them into place. You may want to lightly sand the tube for better adhesion. To help speed up the process, simply hold the fin in place, check your alignment, and wick some thin CA at the joint of the fin and tube. Once the glue has set, you can go back and completely glue the fin and use thick CA for your final fillet.

When installing the exhaust fins, if there is any material overhanging aft, simply wait until the fins are dry and sand the ends even with the end of the tube.

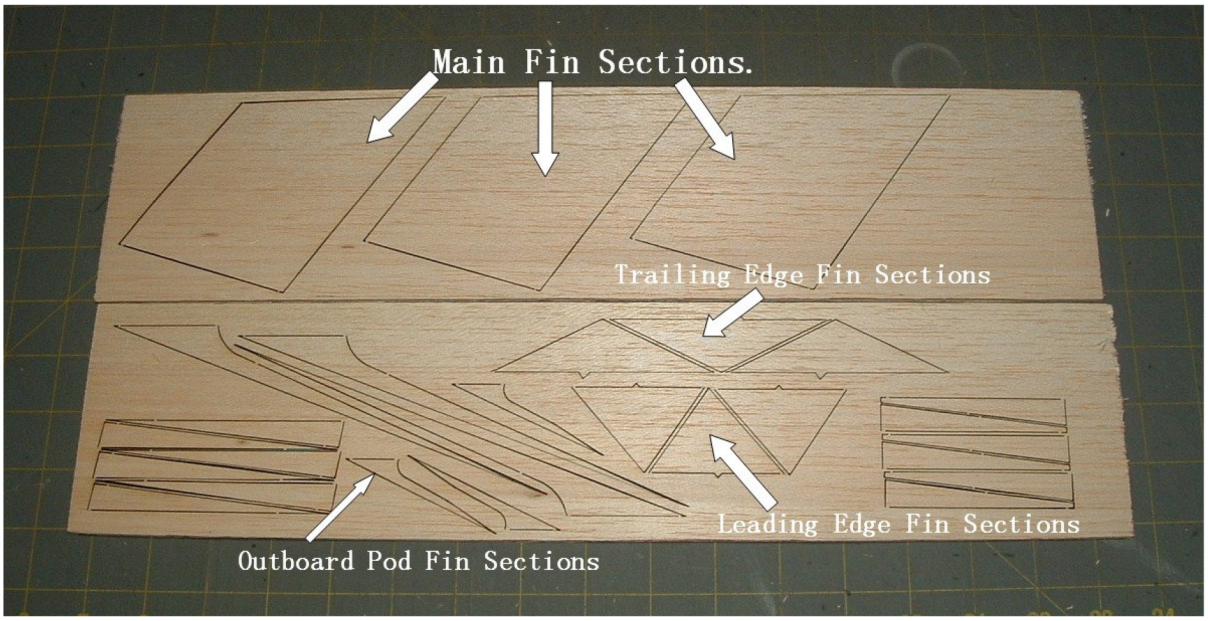

You can sand off excess material after everything has dried


All exhaust cooling fins in place ready for a final light sanding.

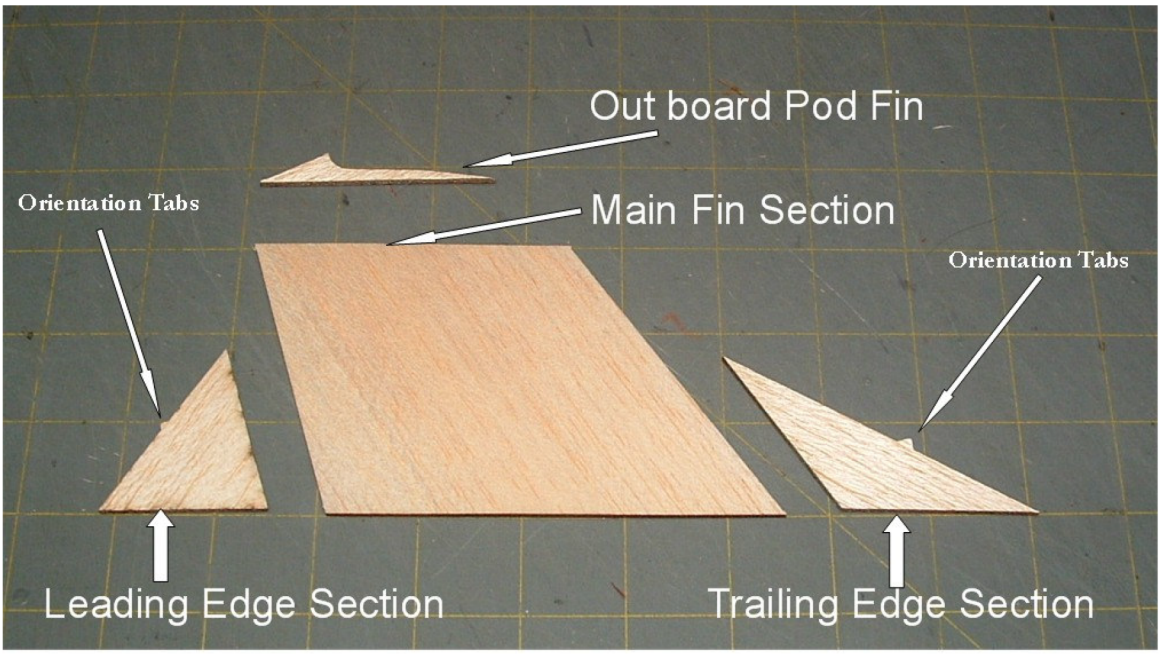
3- Using the same method as you did with the exhaust cooling fins, install the intake fins. Let dry. Notice the alignment with the larger body tube on both the intake and exhaust areas. Sand the top of fins so that they are flush with top of large body tube.

Fin and Pod assembly…

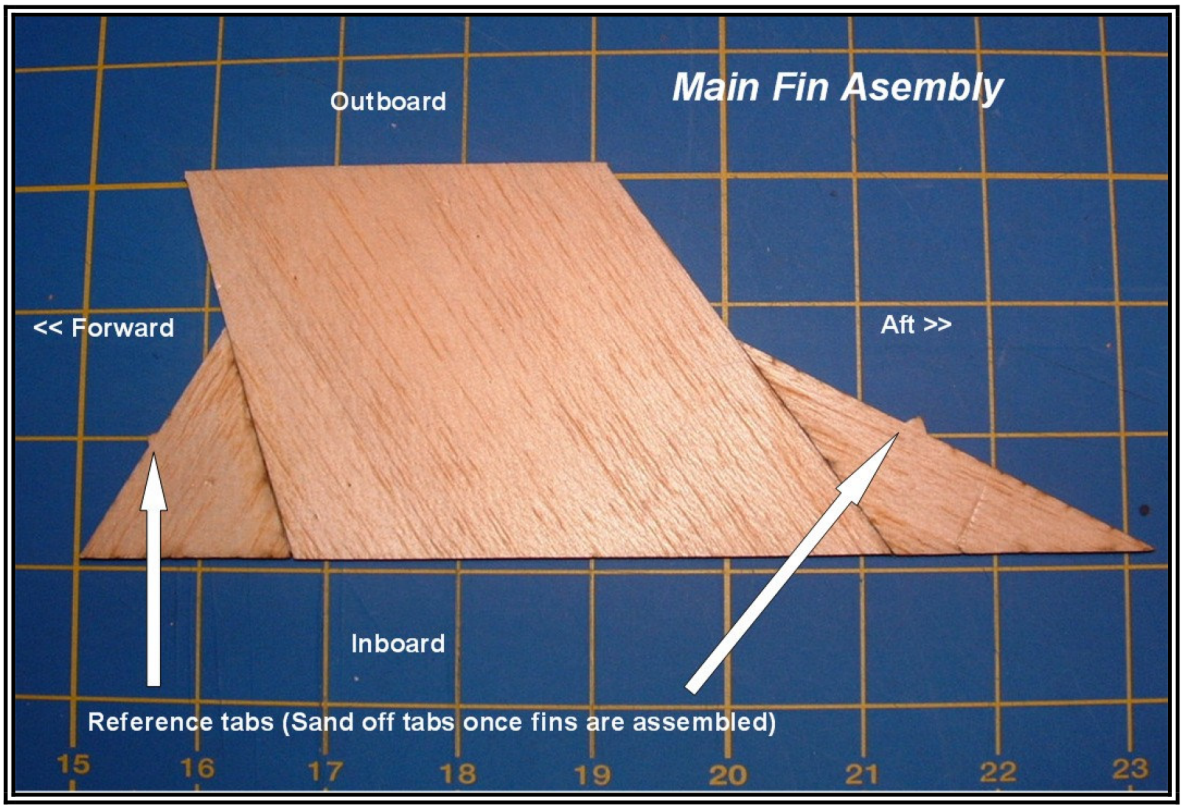
1- Locate all of the pieces for the main fins and outboard pod fins. See photo for clarity.



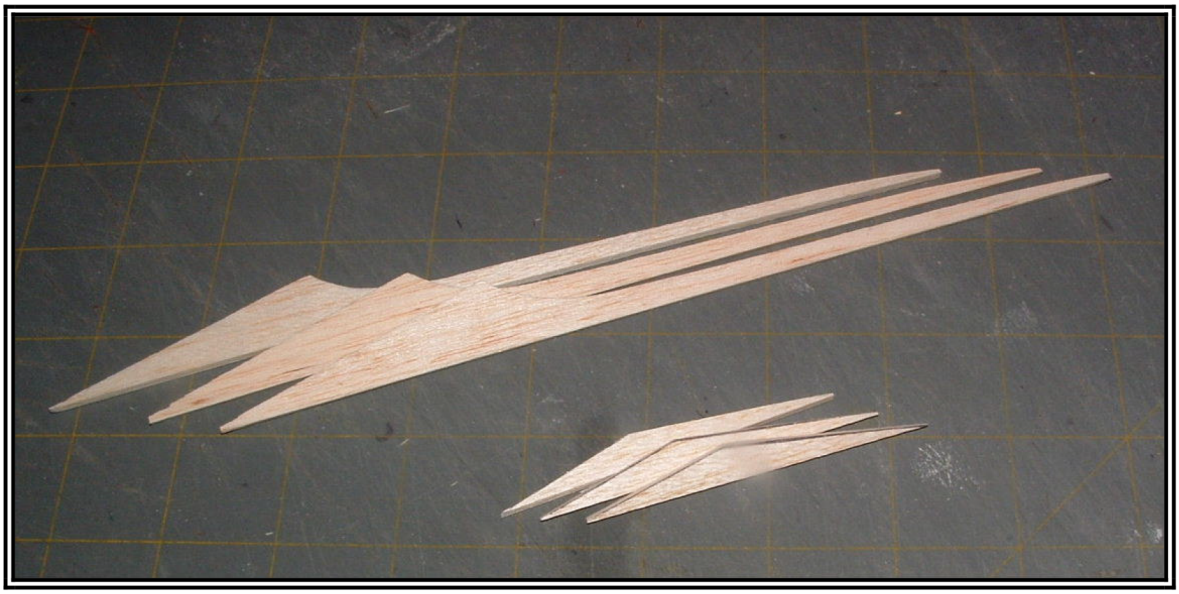
3- Note the layout of the pieces below. Pay particular attention to the direction of the wood grain and the *orientation tabs* (which can be sanded off later) as noted in the photos.



4- Using a piece of wax paper or saran wrap, pin down and glue the main fin pieces together. Use the root edge as a base line. I use a straight edge to keep the root edge straight. Observe the orientation tabs on the forward and aft pieces. These should help you orient each of these to the main piece. Once the assembly is dry, you can sand off these forward and aft tabs. The root edge is the edge that gets glued to the body tube or the pod tube. Make three sets. Let dry thoroughly.

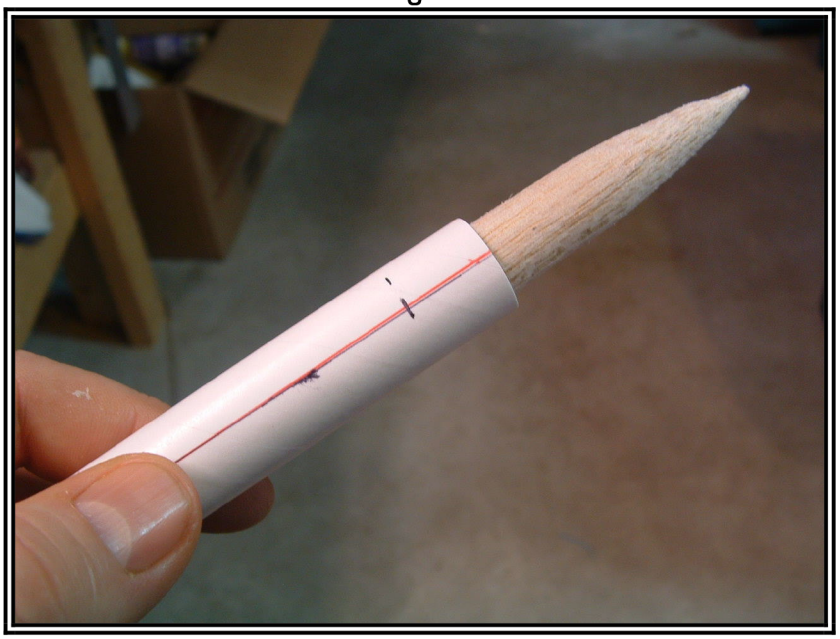


5- When the main fin assemblies have dried, carefully remove them and stack them together. Check to insure root edges are straight and consistent with all three. Sand and round the leading and training edges. Sand any excess glue from seams and fill any pin holes as necessary. Once the fins are attached, it will be difficult to do any heavy sanding so do as much finish work as possible at this point.

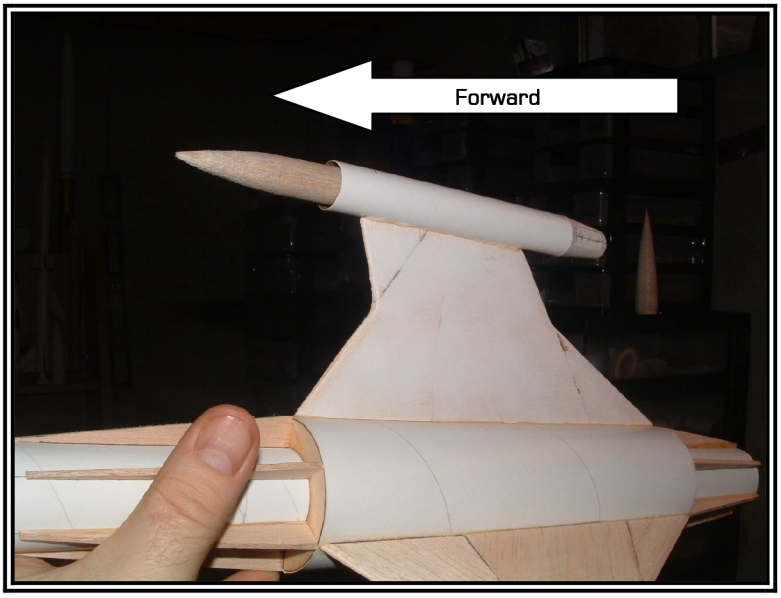


7- Attach the main fins making sure the leading edge meets the forward edge of the large body tube. To improve adhesion, use a pin to make tiny holes along the fin attach point so the glue can seep into the tube. Repeat with the other two making sure each fin dries thoroughly in between. Let dry thoroughly and go back and apply a second coat of glue to make a smooth fillet.

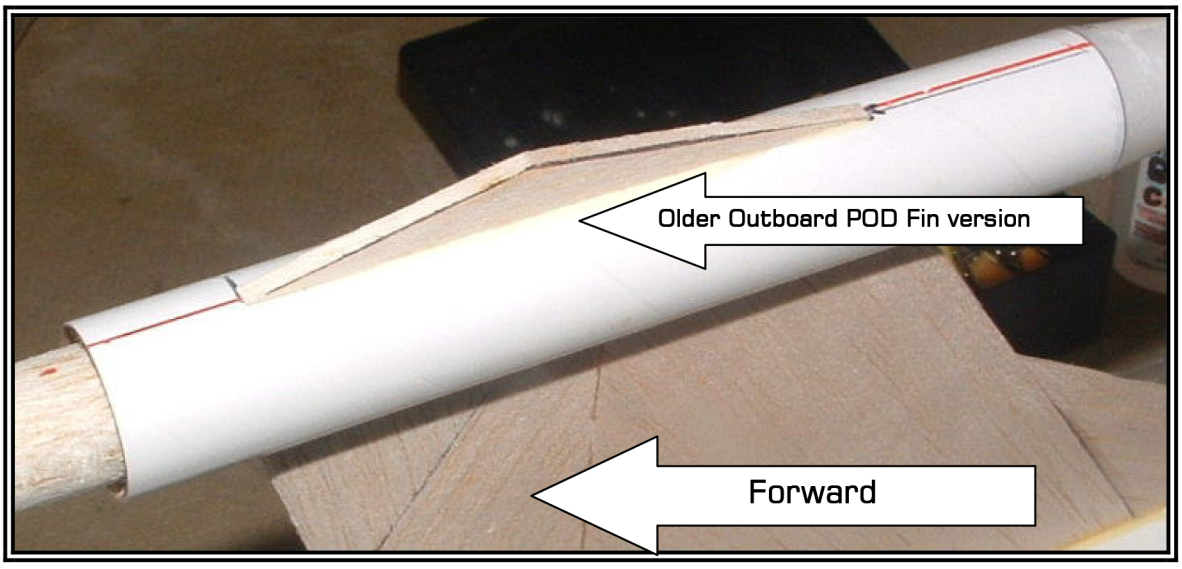
8- Mark all pods 5/8 of an inch aft, from the forward leading edge of each pod tube. Do this on both of lines (one on each side). These pod marks will be the reference points for the leading edge of both the inner and outer fin leading edges.

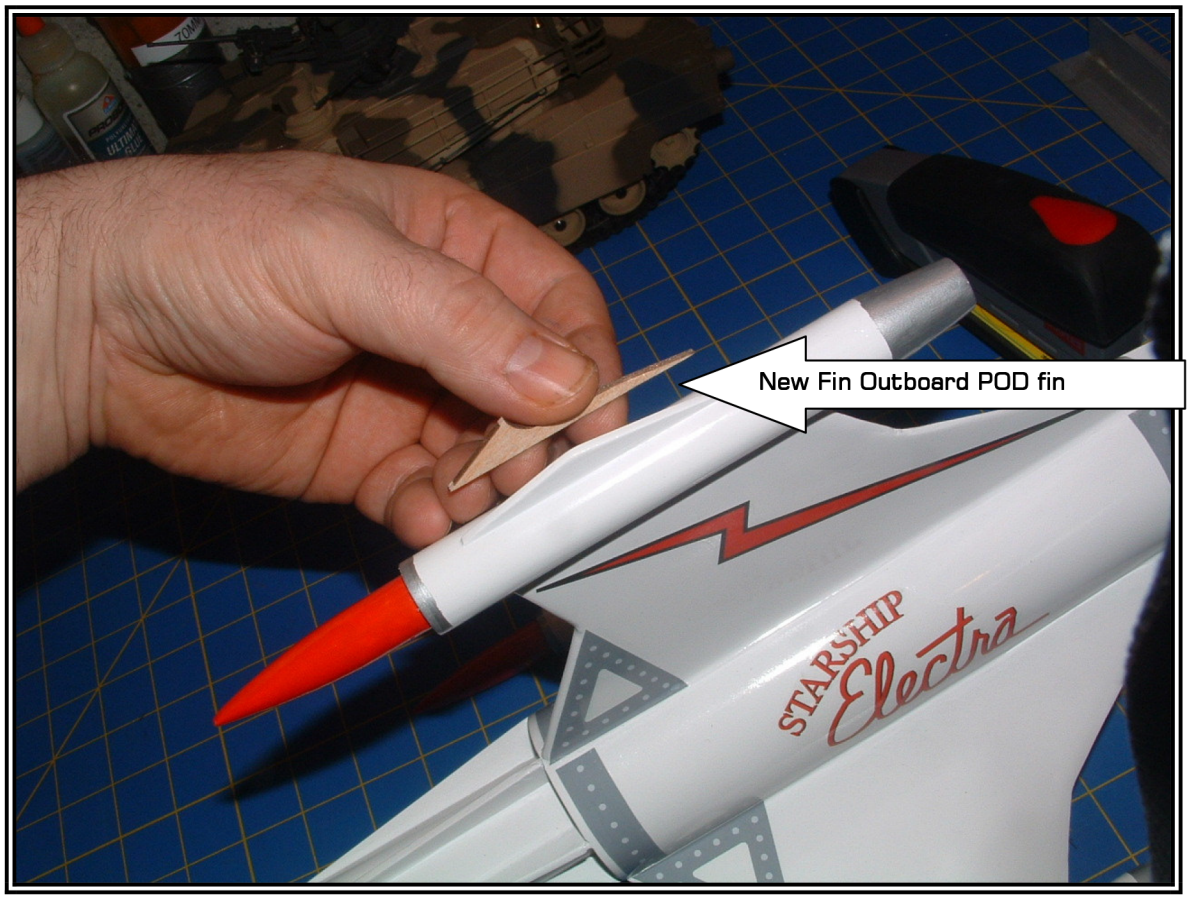


9- Glue the pods, one at a time, to the inboard fins, resting the leading edge of each fin, on the 5/8^{s} inch mark on each pod. Let each of these pods dry thoroughly before adding the next pod. Let dry thoroughly and go back and apply a second coat of glue to make a smooth fillet.

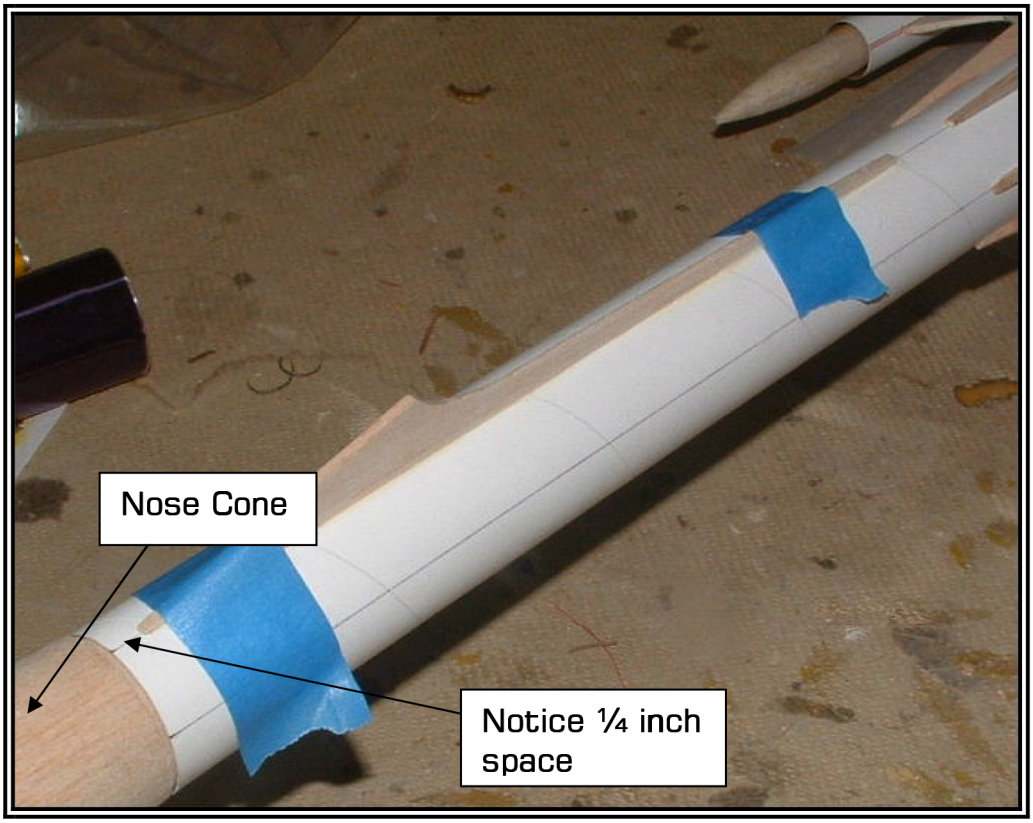


10- NOTE!! The original model had small triangular outboard fins as shown in the photo below. I have since changed the design so that these now look more like that the forward fins. Either fin will work for flight, it is more a matter of choice. However, the new fin is provided as a laser cut piece. Once all the pods have been glued, and dried, glue the small outboard fins using the other 5/8 inch mark as a resting place for the forward edge of each outboard fin. Be sure to place them in the right direction according to the fin pattern sheet. Do this with all three pods. Let dry thoroughly and go back and apply a second coat of glue to make a smooth fillet.



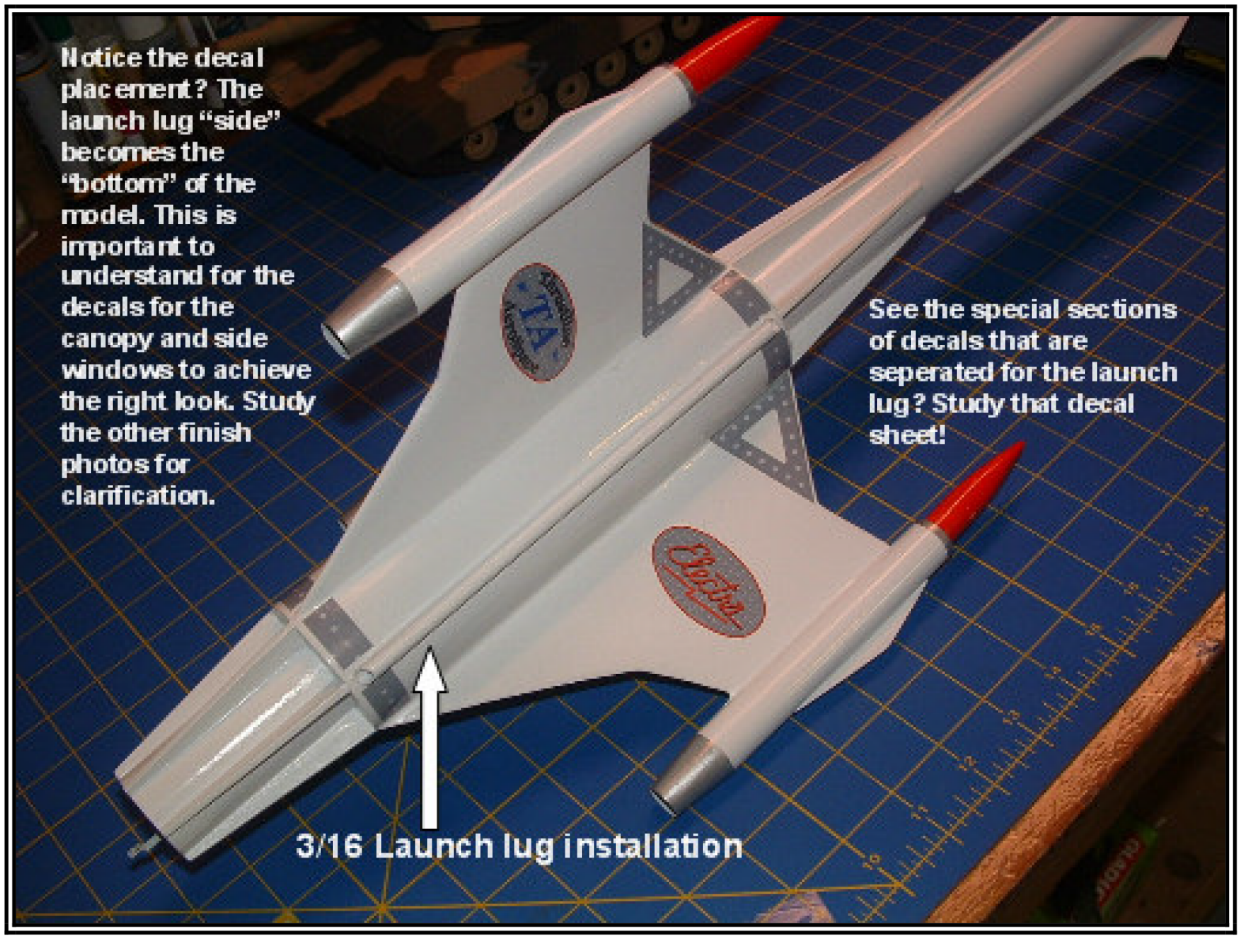


11- Make a mark ¼ inch aft of the forward most edge of the body tube. Glue the three forward fins with the leading point of each fin resting on this mark. These will be in alignment with the main fins. See next photo for clarification. You may want to use some tape to hold them in place while they dry. Go back and check all joints and add another coat of glue where needed. Let dry.



Launch Lug Installation! *PLEASE READ!!!*

1- The original plan was to have 2 launch lugs and as luck would have it, it really didn't look that good. So, here's the most recent version of mine. (Next photo) Your launch lug will be just as long as the large main body tube. Taper the ends and glue it as illustrated in the following photo. Notice it lines up nicely with the intake and exhaust fins? It's really important that the area (or side if you will) that the launch lug is installed, becomes the "bottom" of the model. Sounds weird but all of the decals go in areas that are specific. All of the windows and canopy decals go on the opposite side of the launch lug. Also, there are four special decals for that surround the launch lug for the main airframe. Understand where they go now, and it will make that much more sense later when it come time to finish the model.



Nose Cone Weight-

I have included the exact amount of nose cone weight needed for stable flight. Drill several 3/16 holes, slightly off center, into the base of the nose cone. (Reserve the center area for the screw eye to be installed later.) Fill these holes with the "BB's" and back fill with epoxy. Install nose cone eyelet in center of base with epoxy or similar glue.

SANDING AND PAINTING

As one might have guessed by now, the finish work you do here will greatly determine the final look of your model. Using balsa filler such as Elmer's fill and sand works extremely well and can also be used to fill body tube gaps and seams. Check all glue joints for that second coat of glue if joints look like they can use it! Once the model has been filled and sanded, use a cloth to remove as much of the dust as possible. Use a good sandable primer to build up your base coat. Additional coats may be required to achieve the finish you are looking for but generally 2-3 coats of primer (Sanding in between coats) should be plenty.

The final design was painted with 3 coats of a gloss white, followed by detailing using red for the inlet cones (on the 3 pods) and silver for their respective exhaust areas. (Thanks to Chan Stevens and John McClure for the assistance with paint choices and colors!)

Decal Placement- Study all of the finish photos for decal placement. Again, be sure to take care with placing the proper decals in the proper position

respective of the canopy and the launch lug. Study the entire model and the decal sheet before you start "Dipping" your decals. You should be able to look at each decal section and know exactly where it goes. NOTE- Your decals will need to be treated before you dip or handle them. See the instructions in decal packet that is included with your decal sheet.

Final Assembly…

1- Glue the steel eyelet into the center of the nose cone. (See "Nose Cone Weight" section above)
2- Tie shock cord to the steel eyelet.
3- Give all balsa surfaces a coat of your favorite sanding sealer. I use Elmer's "Fill N' Sand" because it's water based and can be thinned for sealing or used straight to create neat fin fillets. Also fill in any spiral lines on the tube the same way. Sand all sealed surfaces and prime with a quality primer. Be sure and follow ALL instructions while using paints or any finish on your model. And, always make sure there is plenty of ventilation!

Flight Prep-

1. Assemble parachute according to instructions.
2. Attach parachute to Steel eyelet by way of snap swivel.
3. Use appropriate wadding and pack chute as usual.
4. For first flight, it is recommended that you use a D12-5 with motor adapter (see instruction sheet for motor adapter.)
5. Be sure and follow al NAR safety guidelines when launching this rocket. If you would like to review them, go to: http://www.nar.org
6. Check over entire model for flight integrity and serviceability prior to flight.

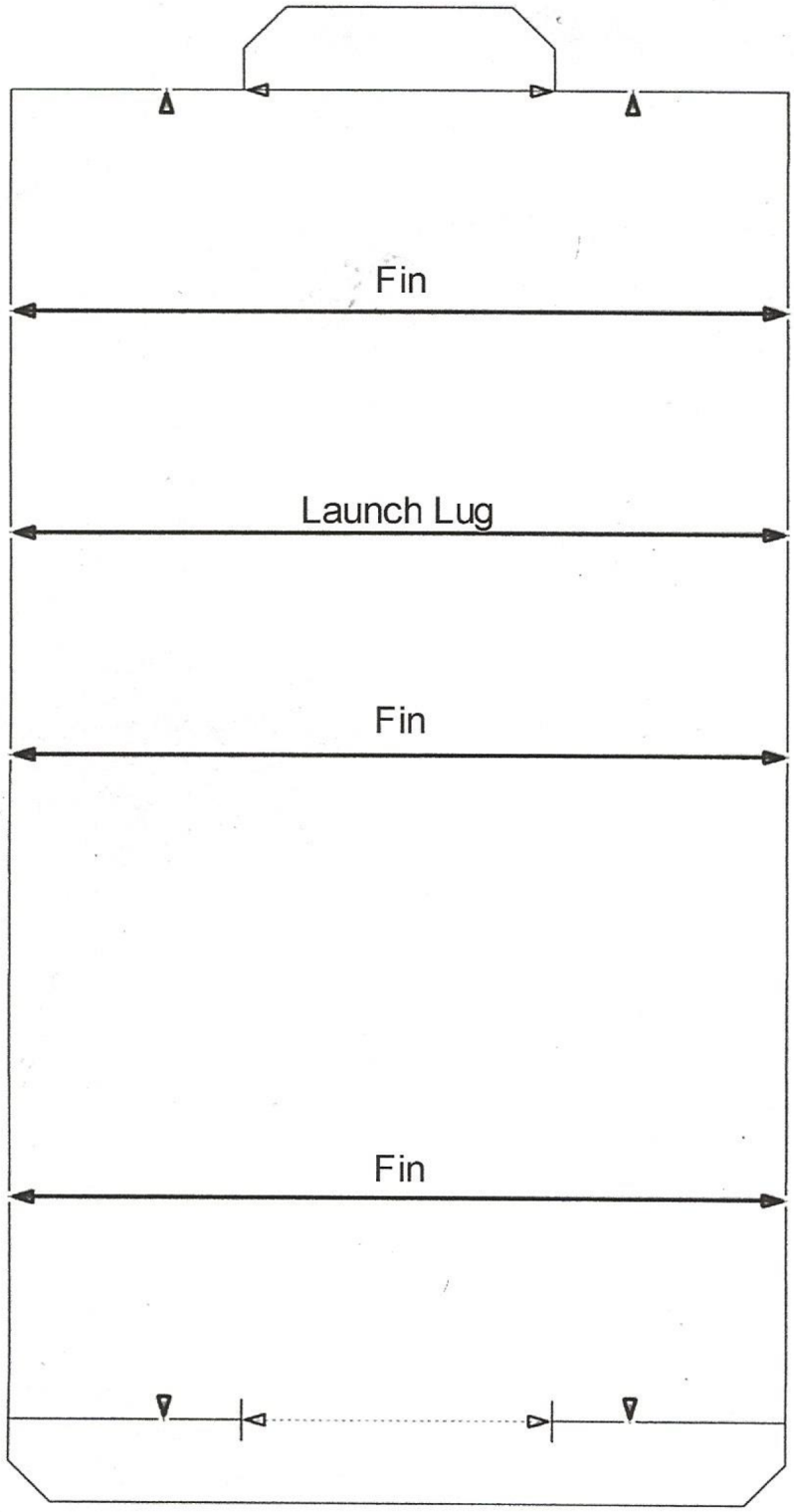
If you have any questions, please feel free to e-mail me at rocketman1959@netzero.com

Rocket Specifications:

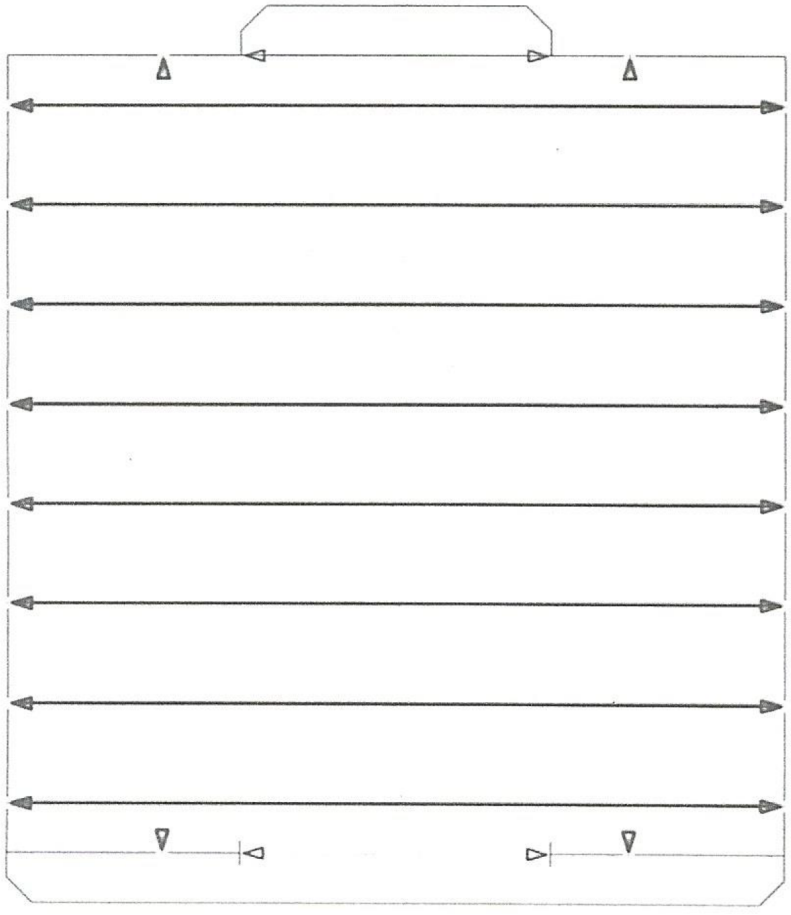
Length……32.5 inches
Diameter……2.2 inches
Weight……6.0 oz.
Recommended motors……D12-3, E9-4
Parachute Diameter……20 inches
Anticipated Altitudes……600-1200 feet
Design Type……Futuristic
Designer……John Rowan-Stern
Beta Test……Chan Stevens
Paint and "Bondo"……John McClure
Skill Level……4
Preferred Beverage while building…..Dr. Pepper

If you have any questions, feel free to e-mail me a
rocketman1959@netzero.com

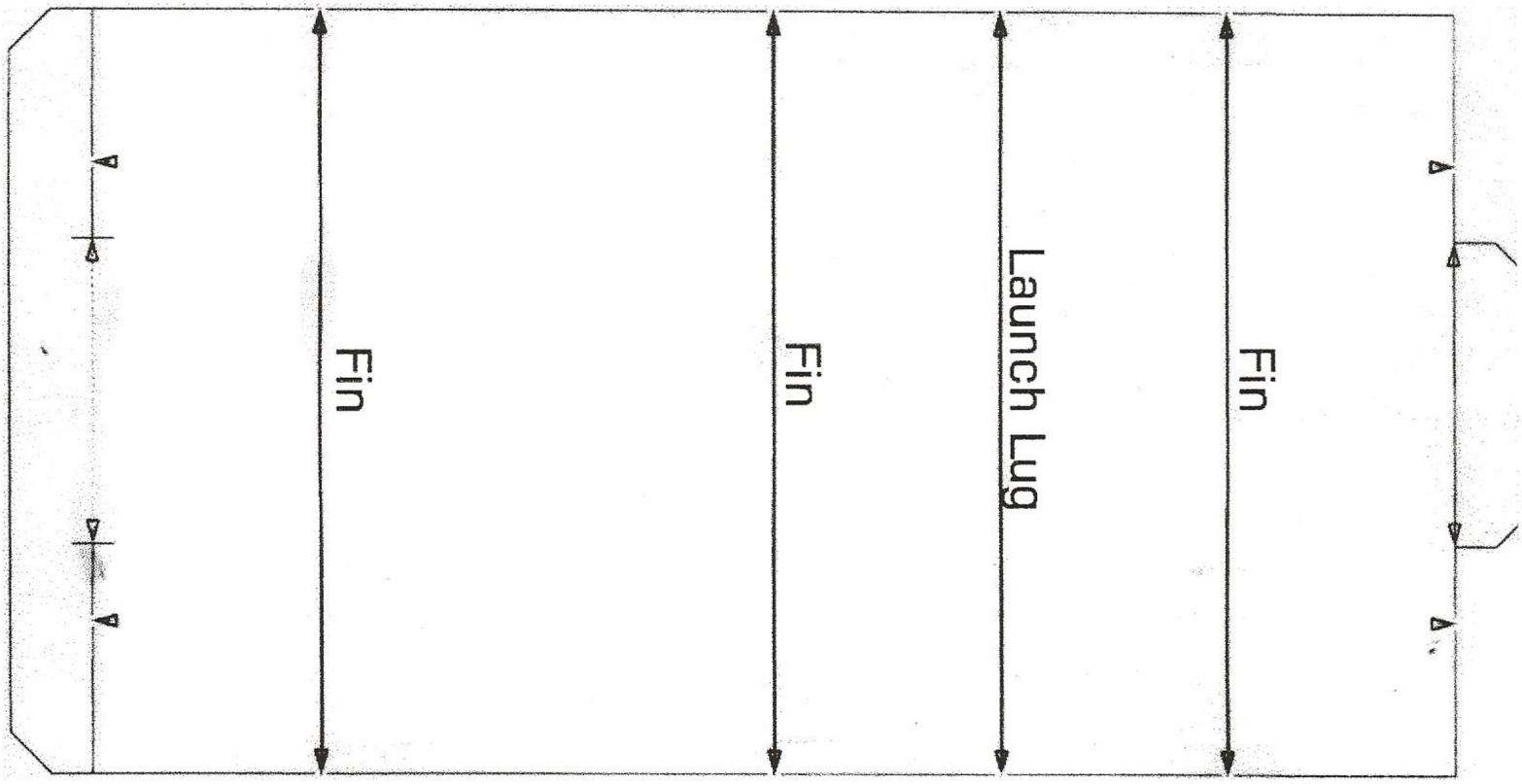
Fin Wrap for BT70 Section



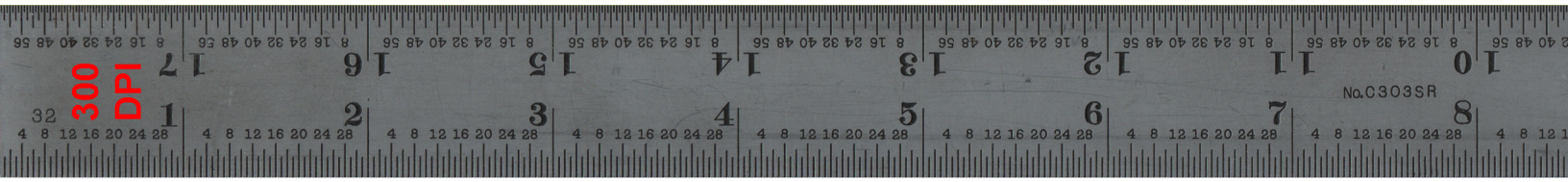
BT55 Fin Alignment Wrap



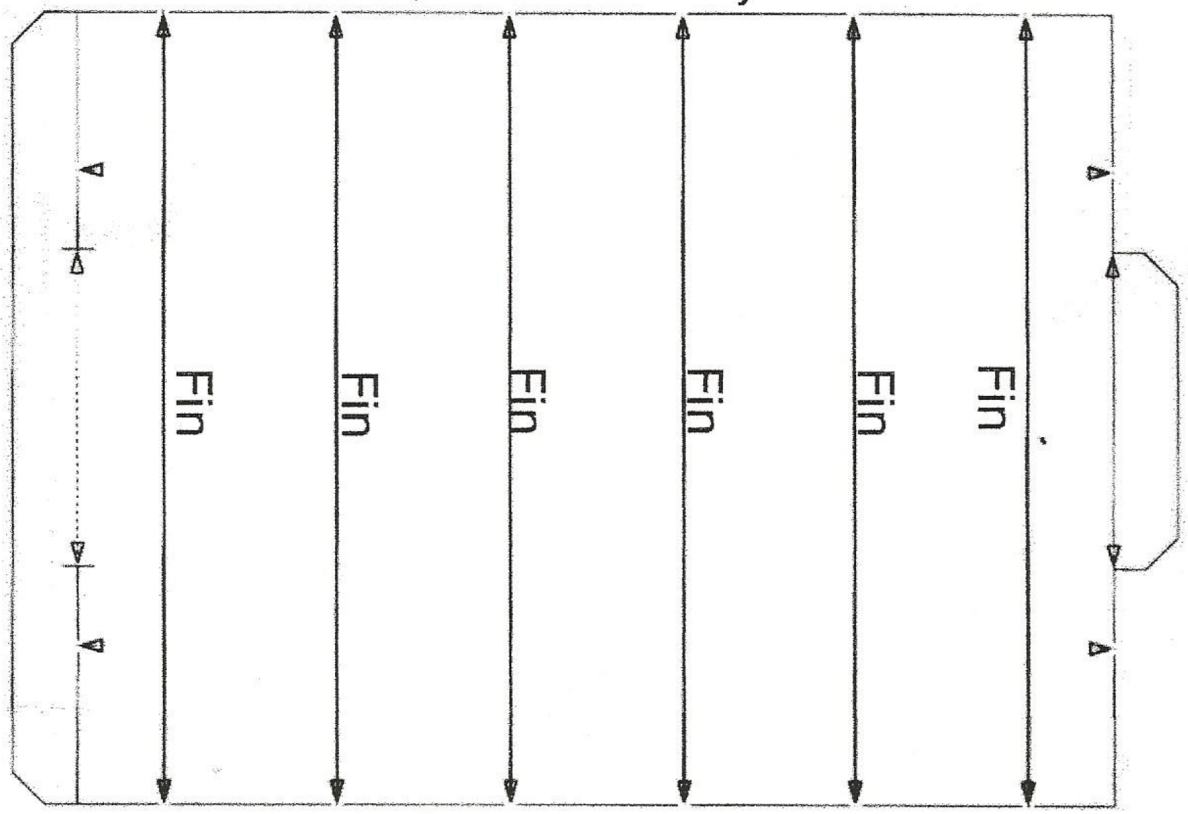
Main internal and external body tube fin wrap guide

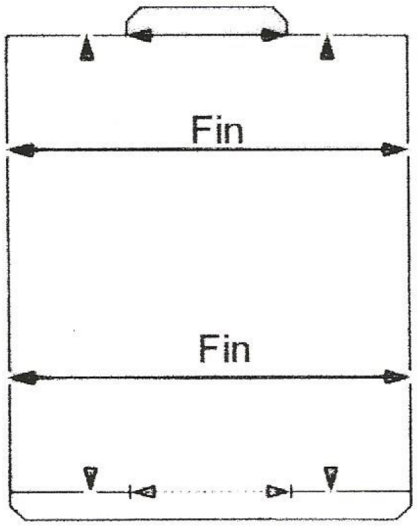


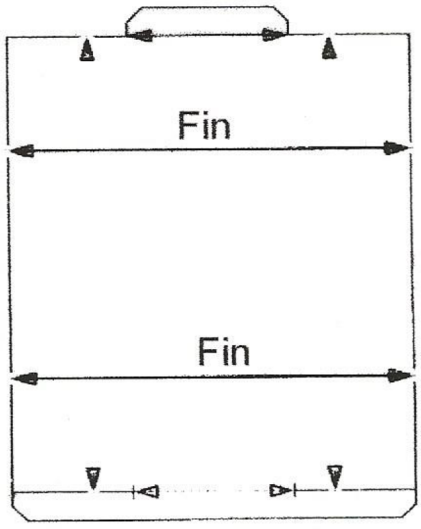
(Larger, external body tube)

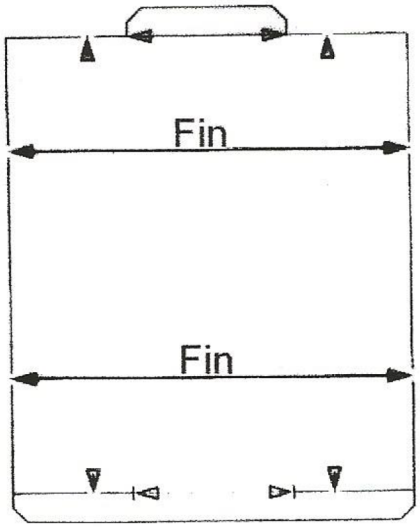


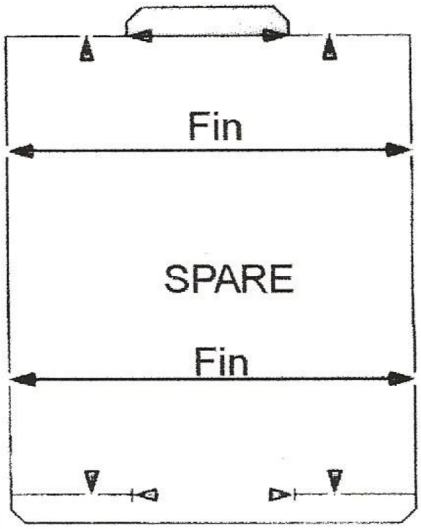
(Smaller, internal body tube)







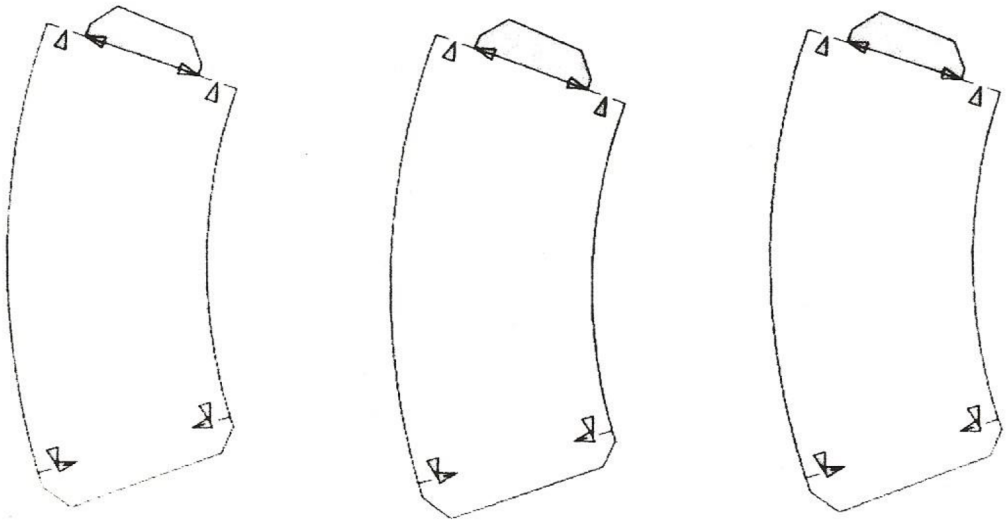




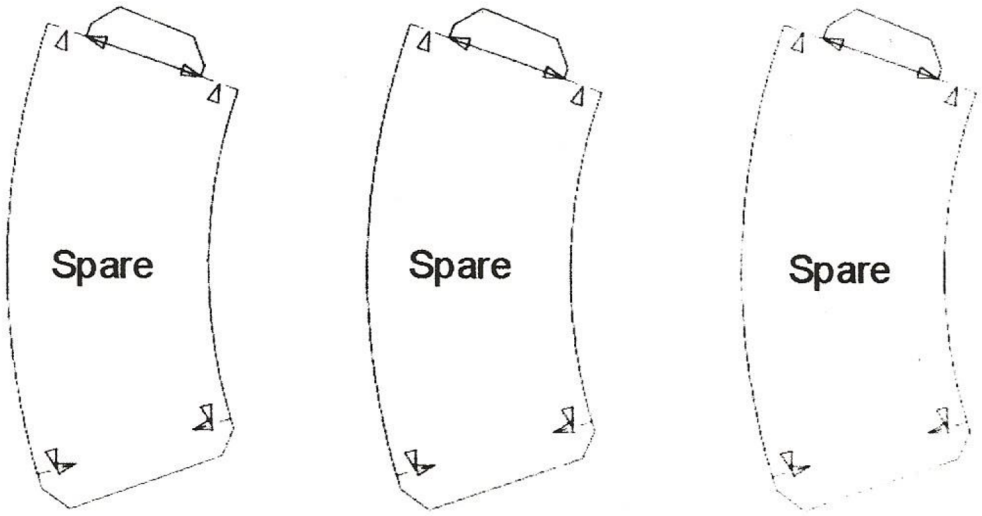
Pod Fin Marking Wraps-

I have included three wraps plus a spare. Cut out and wrap around pod tubes so the all alignment marks are mated.

Mark off the two fin marks and draw lines to connect.

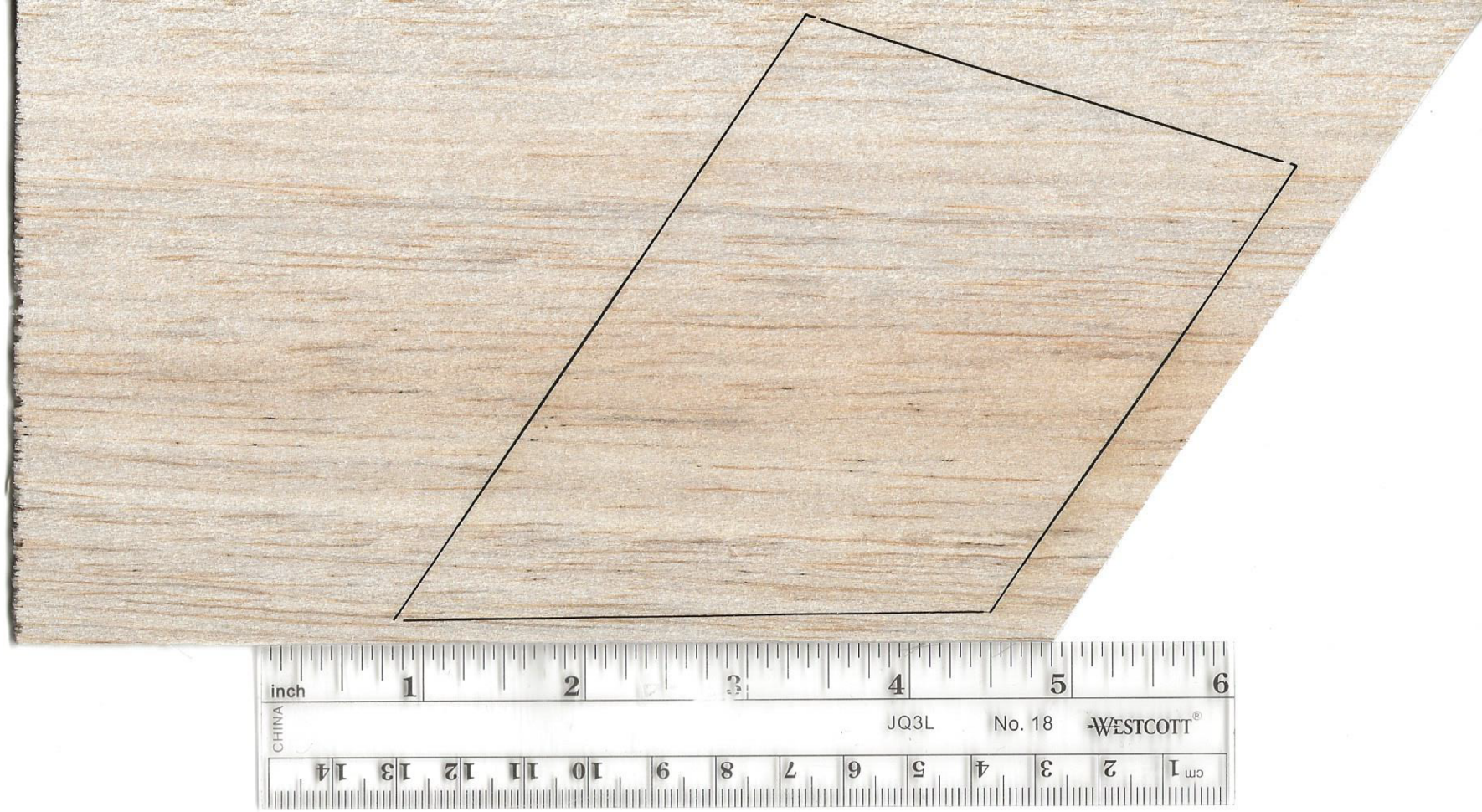


I have included six patterns. You'll only need three, but I included three spares just in case one or two get damaged.



Pod Shroud Sheet

Cut along outside line. Pre-curl around a round object such as pen to help give it a bit of a curl. This will help during the glueing process.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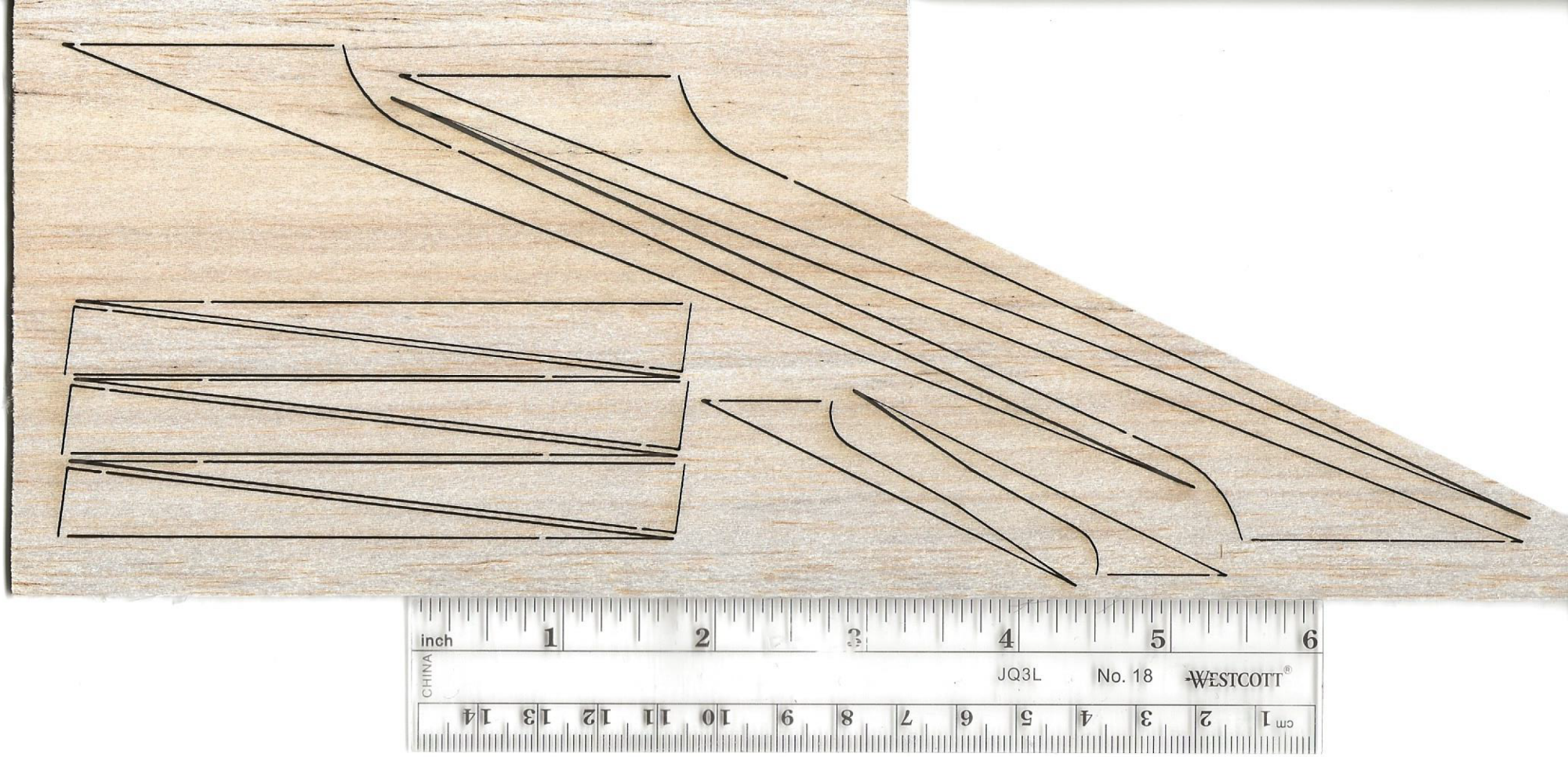
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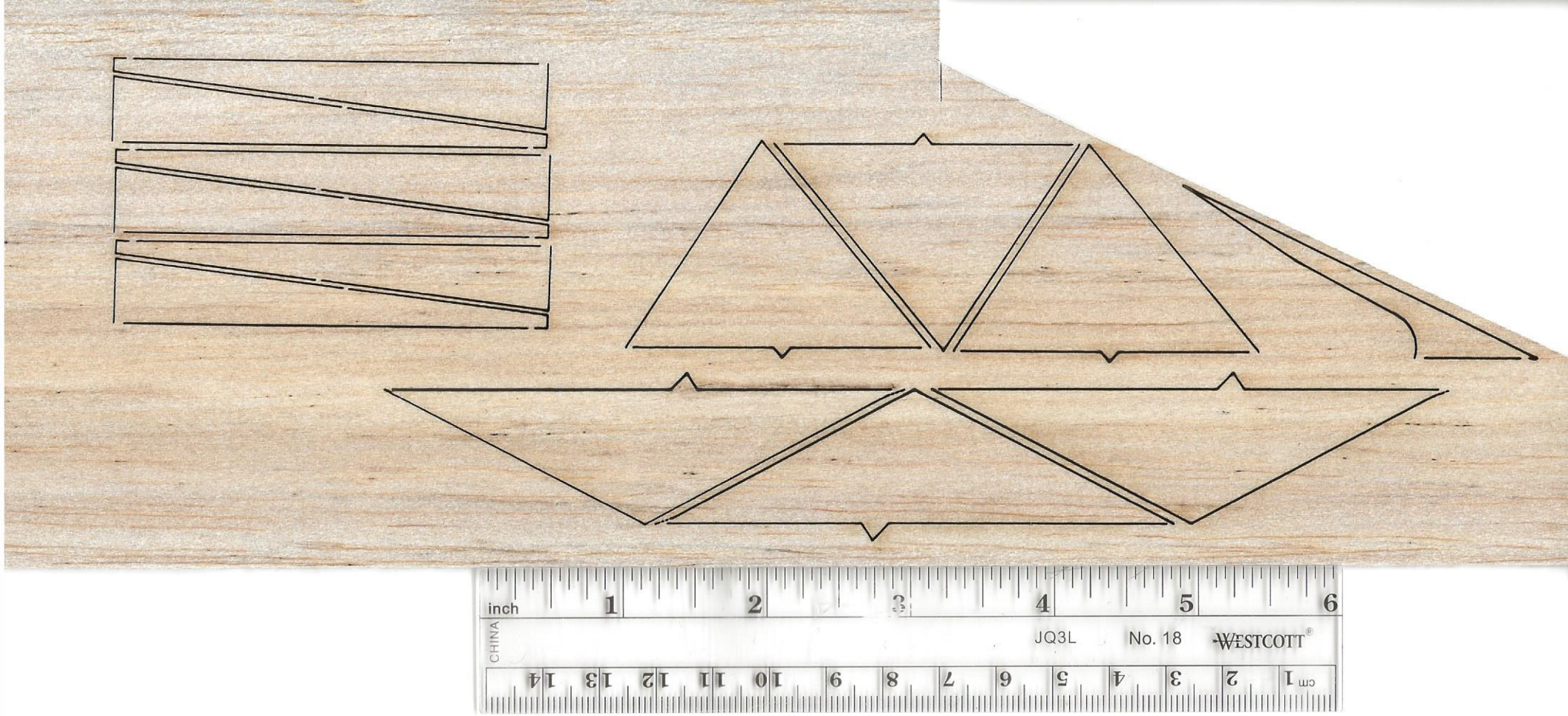
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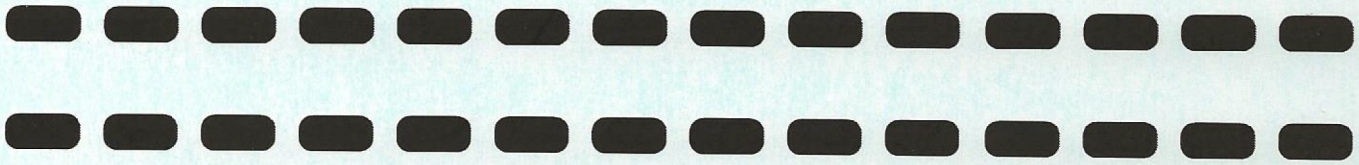
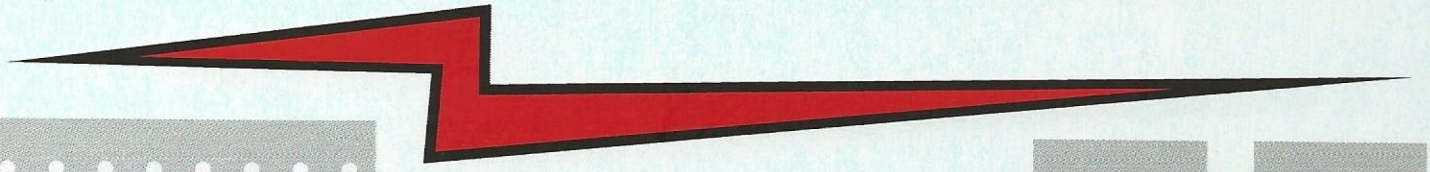
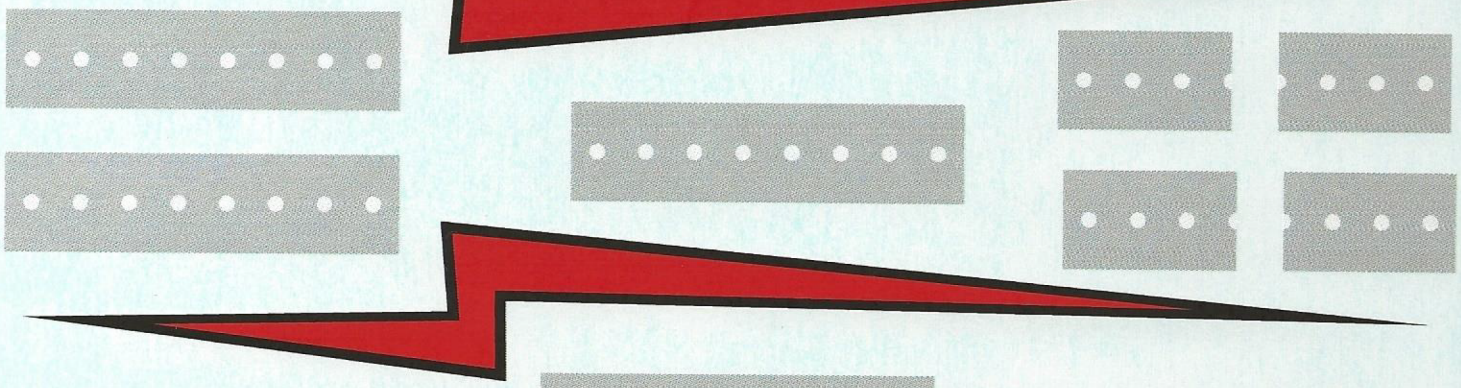
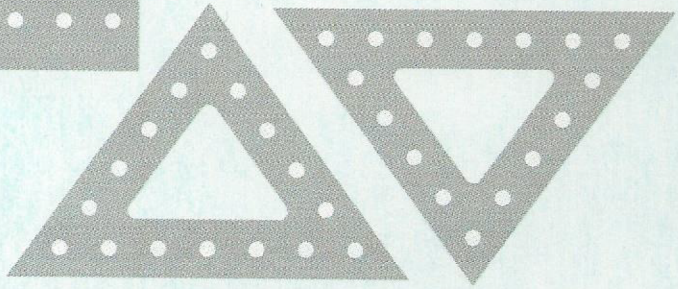






STARSHIP Electra



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FOR MODEL ROCKETEERS

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Decal Application Instructions.

The following items and products are recommended:

1. A sharp hobby knife with a fresh blade.
2. A straight-edge steel ruler.
3. A smooth board or self healing cutting mat.
4. A bowl of warm water with two drops of liquid dish detergent.
5. A small modeling paintbrush (size #1 usually does the trick).
6. Several disposable foam brushes.
7. Microscale Liquid 'Decal Film', 'Decal Set' and' Micro-Sol'.
8. Several ready for use paper towels.
9. Future brand floor finish.

1. Make sure that the paint on your rocket is dry. Acrylics can be dry to the touch in 30 minutes and thick gloss Enamels can take up to a week to dry. You should wait an absolute minimum of 24 hours with any paint before applying decals.
2. Using a foam brush, "paint" the decals with a coat of Microscale Liquid Decal Film. This film will dry to an invisible coating that protects the decals and makes them just a bit tougher. Discard the brush after use.
3. Excelsior decals are printed on a solid sheet of decal paper. In a way, they are one large decal. Use your metal straight-edged ruler and the hobby knife with a fresh blade to cut as close to the desired design as possible.
4. Soak the decal for approximately 10 seconds in a bowl of warm water with a drop or two of liquid dish detergent, then set the decal aside on a paper towel for about 30 seconds to allow the decal to become free of the backing paper. It is suggested that you soak one decal at a time.
5. Using your small #1 modeler's paintbrush, 'paint' the area where the decal will sit with Microscale Decal Set. Apply the decal by sliding it off of the backing sheet directly onto the model. As the decals are very thin, it is not suggested that they be removed from the backing sheet and then applied to the model.
6. Position the decal on the model. We find the #1 paintbrush to be excellent for this purpose. Do not drag the decal with your finger as it may tear. If the decal is really sticky, or folds on itself, dip the #1 brush in the warm water and apply this to the decal to free it up. Blot any excess decal set or water with a paper towel, but no not touch the decal itself.
7. When you have applied all of the decals and are satisfied with how they are positioned, apply the Microscale Micro-sol to the decals according to the instructions on the bottle. It is vital that you do not touch the decals once this solution is applied as it makes the decals very soft so that they will conform to the model's surface. Blot any excess Micro-sol with a paper towel. Let the Micro-sol dry overnight.
8. Using another foam brush, coat your entire model with a thin coat of Future floor finish. This is an acrylic gloss coating that will not harm the decals and will provide a very shiny protective coat. Some modelers will wipe off any excess Future with a paper towel. You may want to experiment ahead of time to see what works best for you.

Krylon clear coats are not recommended, as they may attack the decals. Testor's Dull-Cote does not affect the decals but has a yellow tinge that may increase with time.


The Starship
Electra
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