

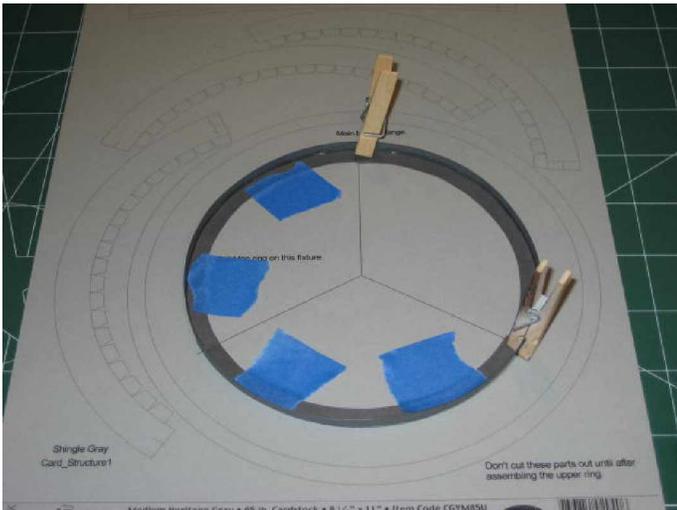
## Mercury Capsule Antenna Fairing Card Model

The following files need to be printed on the indicated color card stock. The card stock can be found at most scrapbook stores or art supply places. Don't get hung up on the colors. The different colors in the structure are just to add a little 'depth' to an otherwise simple model. Pick a color you like for the shingles (medium to dark gray). Maybe we can get a fellow card modeler to add some better graphics to the surfaces. I would be happy to provide vector files to someone qualified and willing to do this. Most of the circles match a standard hole punch size that can be found at art supply stores or scrapbook stores. Buying the more common ones like ¼ and 1" can save time and frustration while making near perfect circles. I actually used Light Morning Mist, Medium Morning Mist, and Dark Morning Mist, all from Color Mates. I bought them at the local scrapbook store.

File	Sheet name	Color
Card_Fixture1	Fixture	White Card
Card_Antenna1	Cross Section	White Paper
Card_Antenna2	Side Plan	White Paper
Card_Antenna3	Antenna Structure	White Card
Card_Antenna4	Antenna Dielectric	White Card
Card_Structure1	Main Flange	Shingle Color
Card_Structure2	Antenna Structure	Medium Gray
Card_Structure3	Antenna Structure	Light Gray
Card_Structure4	Bicone Antenna	Light Gray
Card_Surface1	Sides	Shingle Color
Card_Surface2	Scanner Side	Shingle Color
Card_Surface3	Top, Flap	Shingle Color

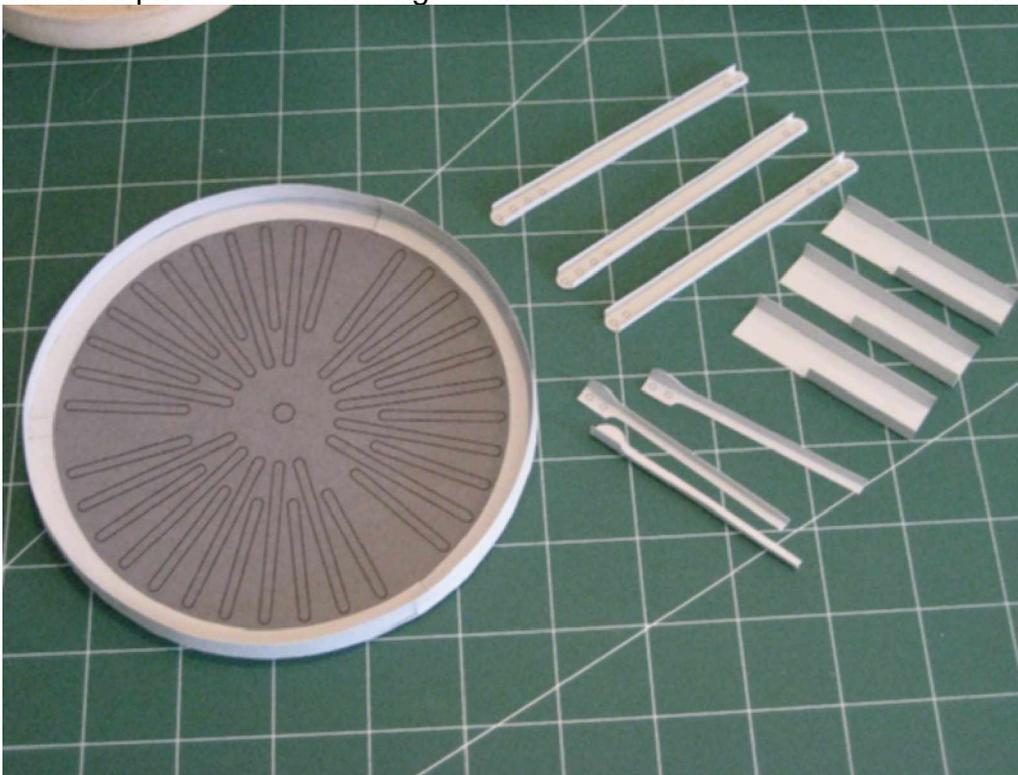


Cut the three ring segments for the upper flange from the bottom of Card\_Surface1 and glue them to Card\_Structure1. Notice the photo below show the wrong color for Card\_Structure1. This is just for the instructions to show where the parts go. We are actually doubling the upper ring to add a little stiffness.



Add the pieces shown under the cloths pins. They are the side ones on Card\_Surface2. Make sure the cone is opening upward. The upper flange is being assembled upside down.

Assemble the lower ring parts (Card\_Structure3) on the main structure bottom from Card\_Structure2. Before gluing, locate the small angle pieces on the bottom and rotate the ring so the small angles butt against a glue joint on the ring and center between the marks on the bottom. The next photo shows the angles installed with the model in the assembly fixture.



Cut out the Card\_Fixture1 and fold on the blue lines. Tape or glue it like the photo. This fixture will be used to hold the top ring in the right place in space as we add the main vertical members.



Add the first main vertical beam from Card\_Structure2 as shown in the left side of the photo. The lightning holes will not line up but don't worry about it. Rotate the model in the fixture until the first beam lines up with the mark on the bottom of the fixture. Add the second member. Now you will have to cut the fixture to get the model out. Just randomly cut near the green line. Carefully rotate the model so you can add the last vertical member. You can use a little masking tape to hold the fixture together while adding the last member. Take the fixture apart again where you taped it together and remove the model. You will not need this fixture again.



Add the 3 upper "U" channels to the main vertical braces. Notice one of these has two small receptacles printed on it. Fold this one 'backward' from the other two. Extended score lines are added to help score the part before cutting it from the sheet. The prototypes used a 1/4" drinking straw for the Ejector tube. It was painted with flat grey or black enamel paint before starting. Cut the straw to size using the Card\_Antenna1 as reference. Fit the straw in place. The straw should go through the bottom if you intend to add the lower ejector tube later. You may need to trim the 3 'U' channels to get a good snug fit.

**SCALE NOTE:**

*The original web on these “U” braces met the ejector tub in the centerline of the tube. It may be difficult to get the parts to fit with any structural rigidity on this small paper model. However, I made some sacrifices for simplicity and strength to allow the final model to be disassembled for viewing.*

*The holes in the main Vertical braces were different sizes but I sized them the same to allow the use of a hole punch to make them more uniform.*

Once you are happy with the fit of the straw, slide one of the triangular braces with the rivet details facing down. Install the straw and glue each “U” channel to the straw. When the glue has dried, slide the triangular support up into place and glue it to the bottom of the ‘U’ channels. Add the top support with the rivet detail facing up as shown in the photos.

Add the lower support plates seen the photo above. They are on Card\_Structure2. Add the diagonal braces. There is a small part on the upper left of Card\_Structure2 sheet that makes up the 3 little re-enforcements between the “U” channels shown. Pre shape the parts and glue in place. Your model should resemble the next photo. This is an early version but it shows all the parts you have added.

Now we need to add the Radio Noise Filter brackets, the filters, and connector bracket. These parts can all be seen in the next photo.

The filter connector bracket is difficult to see in this photo but it shows up well in later photos. Fold it in half, glue it together and let the glue dry. Then make the angle fold to make it look like the photos. Punching the ¼ inch holes in the bracket is optional. The white connector blocks from Card\_Antenna3 can be added. The extra white piece goes on top of the long block and can be seen better in later photos. This completes the basic upper structure. Now we’ll move to the lower dielectric and lower flange.

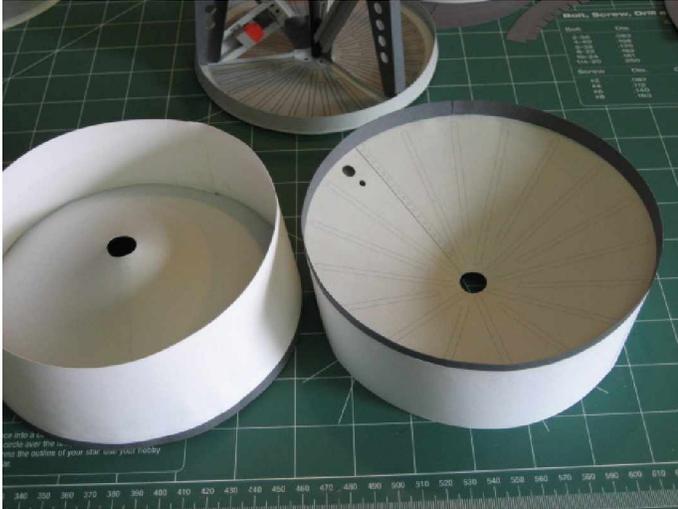
Cut out the pieces on Card\_Antenna3. Notice there are two lines on the right side of the parts. Cut to the outer line and assemble the parts as shown.

Tape the parts together with masking tape and fit them onto the structure. As you slide the dielectric structure down over the main structure, it should just contact the upper edge of the lower flange as shown a few photos above. Notice you can see just a little gray showing in this prototype. A little misfit (1/32”) is acceptable. If the part is too big, you may be tempted to trim one edge to achieve a good fit but its better to re-make the part trimming each part. The prototype was cut to the second line. These parts are easy to print, cut and make, so if it takes a few try’s to get it right, it’ll be worth it.

Once satisfied with the fit, add the lower bands from the top of Card\_Structure1. These go on the inside of the white parts. Fit the white parts to the line on the bands. Do a final fit check and trimming with the masking tape before final gluing the ring together. DO NOT glue the Dielectric structure to the main structure yet.

Cut out the 1” circle and punch the ¼ inch hole in the center from Card\_Structure4. Glue this circle to the bottom of the model centered on the ejector hole. Cut and glue the Bi-cone antenna from Card\_Structure4. You can use a white one or you can print it on something like grey or silver to more simulate the aluminum antenna reflector. Punching or cutting the wire pass through holes in the antenna is an option. The antenna fits inside the dielectric and rest on the lower bands. Carefully work the cone down and you should be able to get it to fit perfectly on the bands. If you struggle, you may have to make a new antenna cone slightly larger or smaller. Careful work should

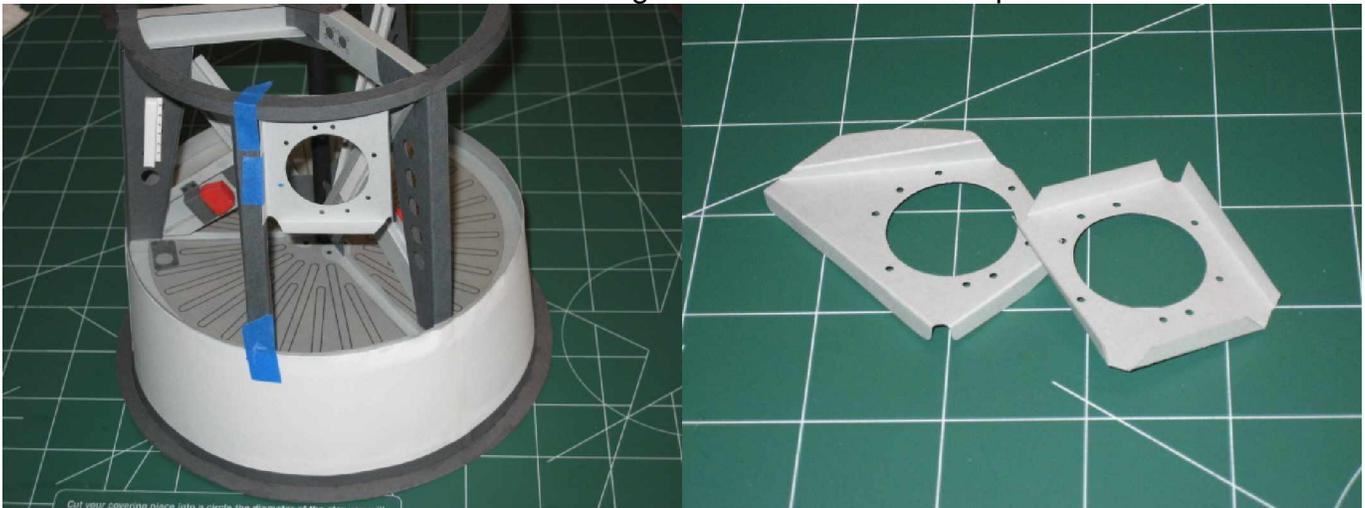
get one to fit perfectly. This is important to maintain a circular shape. Once it fits perfectly, glue in the cone from the top.



The photo shows the part from both sides. The model can be angled slightly and inserted from the top of the dielectric structure and antenna cone assembly. Carefully use a knife or other small thin object to help work the structure into the antenna. After getting it in, gently tug up on the structure seating it firmly against the dielectric structure. This may seem like an impossible task but a little patience and careful work will get it together. Glue the dielectric and antenna cone structure to the main structure. Working about an inch at a time, you can peel back the lower flange from the antenna dielectric and work some glue in with a toothpick.

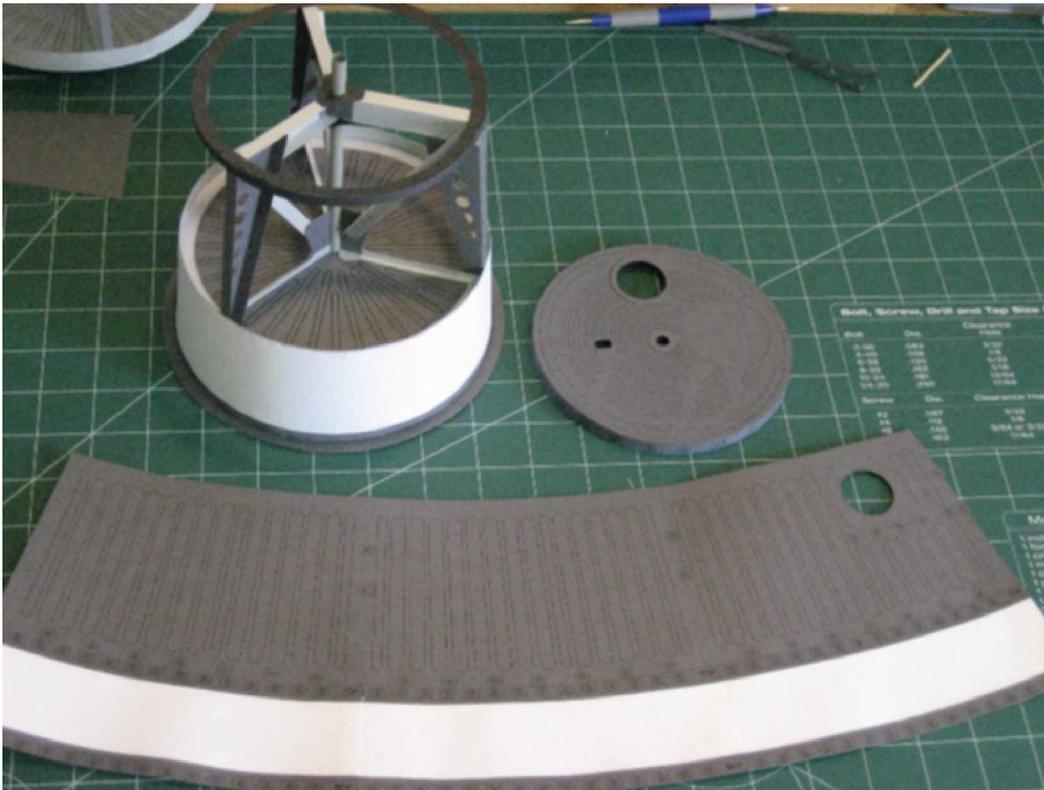
Assemble the main flange as shown in the photo below. Notice the parts with the 'ears' are on the bottom. The main flange on Card\_Structure1 is actually about  $\frac{1}{4}$ " too big around the radius. The larger surface helps hold the shape while gluing the dielectric structure on. The main flange is made up of two thickness of paper to increase stiffness on the final model. Rest the structure on a flat surface and do any minor trimming so the model sits flat on the surface. Test fit the structure to the main flange. Glue the main flange to the model working carefully a few 'ears' at a time. Be sure the flange stays level. Take your time and let the glue dry before moving to the next set of ears.

Trim the lower part of the main flange to match the upper ring. This finishes the basic structure. Now we will work on the exterior to use as a guide to finish the interior parts



The side scanner mount is orientated so the printing is on the back in the above photo. Tape it in place as shown with the vertical brace but DO NOT glue these parts yet. Hopefully you bought a 1/16 hole punch from the scrapbook store...

Cut out the parts from Card\_Surface1 and Card\_Surface2. Cut out the side scanner hole. Glue the re-inforcement to the inside at the side scanner hole location. This can barely be seen in the photos and shows up well in the picture of the Antenna fairing on SC-10 at the end of these instructions. From a distance, this will make the scanner hole look circular. Assemble the three large side panels but do not glue them into the cone shape yet. Add the dielectric window pieces from Card\_Antenna4. The rectangular pieces on the top of Card\_Antenna4 are the Teflon guides for the Escape Tower. They will cover the seams of the outer skin. Set them aside, we'll add them later. Add the flanges labeled TOP and BOTTOM. Since the edges of the will be covered up, don't overlap them as the extra buildup will be hard to hide. You may have to trim the parts. Cut the flange pieces so they butt together. Use one of the Teflon guides to help with the spacing or location of the flange pieces.

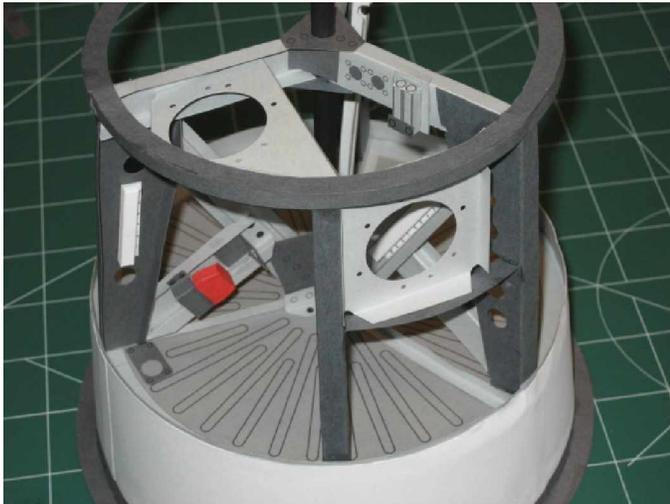


Once the skin is assembled, tape it together and slide it over the main structure. It should be a snug fit at the top and bottom. Adjust the tape until the skin will slide off easily but is not sloppy on the structure. Mark the position and glue the skin together.

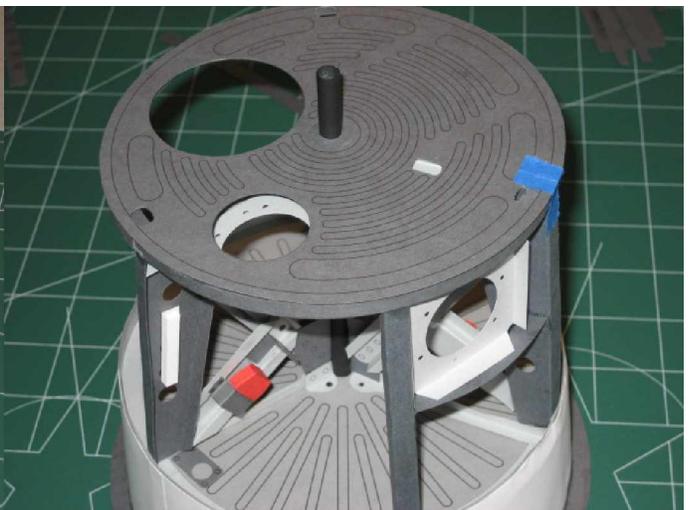
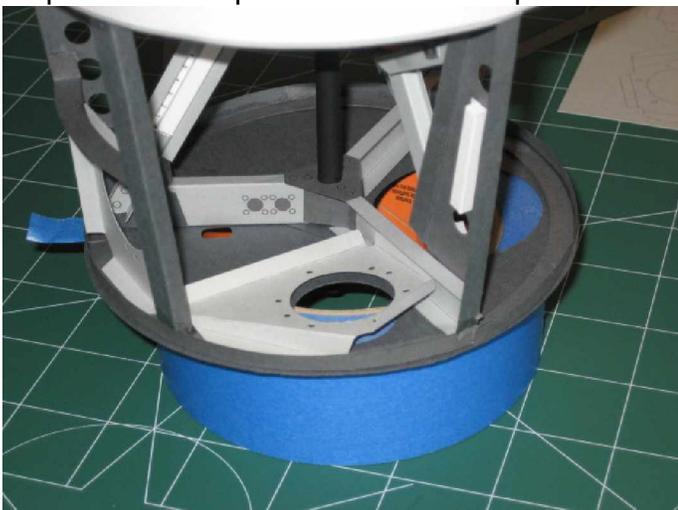
Position the Fairing top on the model and orientate it so the scanner bracket is visible in the side scanner cutout.



The two screws along the seam that are directly above the word “TOP” in this photo should overlap the main vertical braces in the structure. Adjust the side scanner mount to position it correctly. When satisfied, glue the scanner mount to the top ring. Then glue the mount to the vertical brace from the lower right of Card\_Structure2. The circular ring under the mount is one of the two on Card\_Surface3. Adjust the folds for a good fit. Trim and glue the ring in place as shown below.

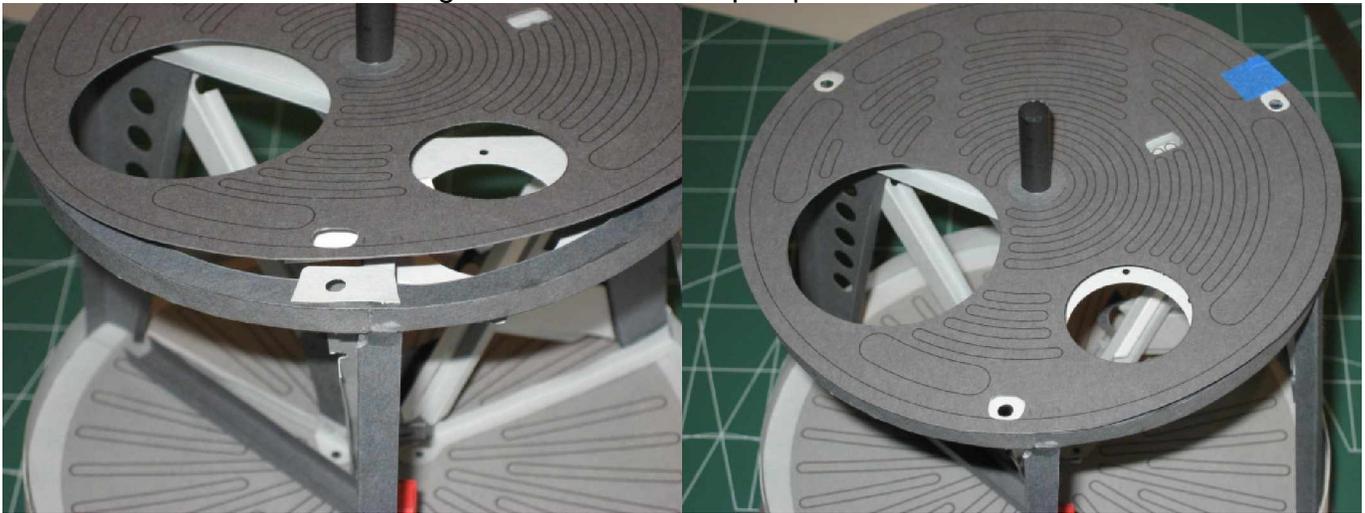


Tape in the upper scanner mount. Notice it is angled down or away from the center. It may be helpful to work upside down like the photo on the left below.

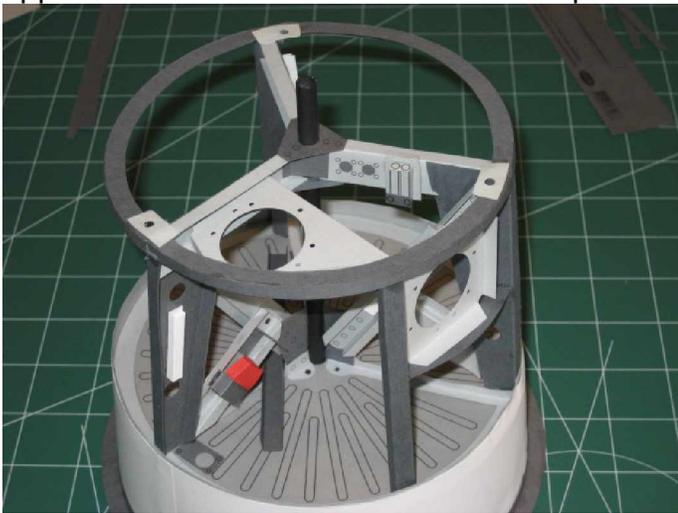


Cut the holes in the fairing top and tape it in place as shown on the right above. Adjust the top scanner mount until its centered on the opening as shown. When satisfied, glue the top scanner

mount in place. Add the drogue bridal re-inforcements as shown on the photos below. Trim the ring under the re-inforcements and glue them with the top in place to locate them.



Your model should now look like the photo below. Build and add the flap cutter as shown on the upper 'U' brace. The cutter also shows up in other photos later.

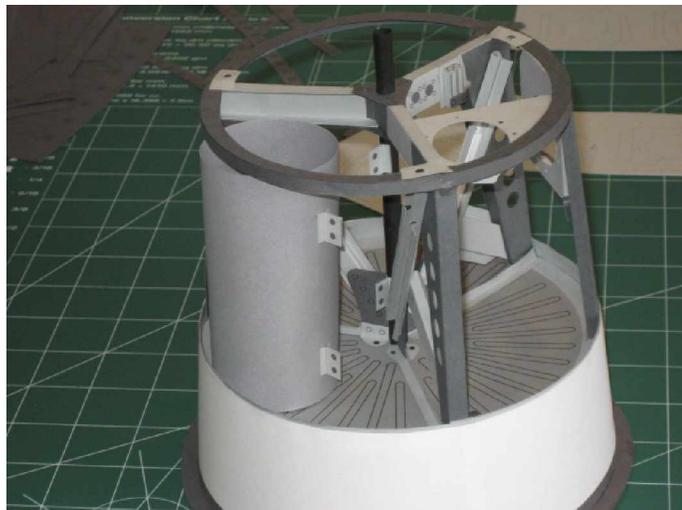


Add the mounts for the drogue mortar tube. Locate the upper one about 1/8 below the 'U' channels. Locate the lower one at the top of the re-inforcement plates as



shown.

Position the mortar tube so its flush with the top of the upper ring and mark the location of the mounts. These are the same ones we just glued to the main ejector tube. The following photo shows this.



Slide the top back on and check the position of the mortar tube. When satisfied, glue the tube in place.

Place the outer surface back over the model. Glue the edges from Card\_Surface3 to the top. Notice the screw at the joint will line up with the screws down the side of the outer surface. Look at the photos to see this. Once dry, carefully fit the top on the main fairing. Hopefully it's a good fit. If for some reason it doesn't fit right, consider making a new top slightly larger or smaller to get a perfect fit. A few minute spent now to make a new part will be worth it in the end. Rotate the top until everything lines up properly. Once satisfied, glue the top to the fairing.

Add the top stiffener rings, the drogue bridle re-enforcements, and the flap hinges. If you plane on making your flap hinge operate, add some extra paper to the vertical part of the hinges on the antenna top. These are included on Card\_Surface3 if you want to use them. The following photo shows these parts. This is an early prototype and you will already have cut out the drogue hole and the cutouts in the bridal re-inforcements.



Locate the flap pieces. Notice the little top stiffener that runs along the hinge line was bent up slightly to increase stiffness. First glue the mirrored piece to the bottom of the flap. You can see it under the hinges and scanner cover in the second photo below. Assemble the pieces on top of the flap. Use a small piece of wire or small toothpick as a hinge and assemble the flap on the top. This is to locate the flap hinges. Once satisfied, glue the hinges to the underside of the flap.



Here are photos of the completed flap.



With the flap installed on the fairing, locate and install the scanner cover so it covers the scanner hole exactly. Notice the gap between the scanner cover and the hinge. This is for the hinge on top of the fairing. Here is a photo of the antenna fairing on SC-15 without the flap. The real top scanner cover was made from fiberglass. You might be able to find a textured off-white paper to better simulate this part. It is hard to see in the photo but the prototype used a textured paper.

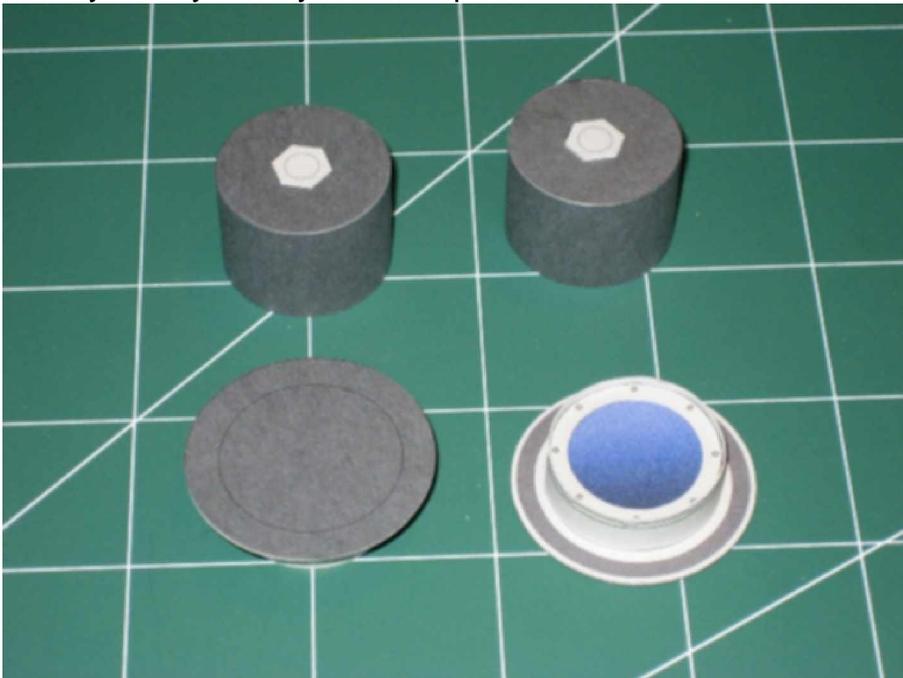


This is the fairing on SC-10. It's in a little better condition. Can you spot the differences?

Finally we'll build and add the horizon scanners. There are 6 pieces for each scanner. They should be all that's left among all those parts you cut out. First glue the upper rings together exactly to the line. While these are drying, cut out the glass mount and the little window. Glue the windows to the mount as shown below.



Note the orientation of the markings on the rings as above. Place a penny in the ring and carefully push the window piece down to the penny, window down. Lift the part and make sure the window is even around the edges and fits level in the ring. When satisfied, glue the window from the back. Glue these window assemblies to the ring with the gray stripe. The gray ring is to show through the holes you may or may not have punched in the scanner mounts.



Glue the lower flange on the back of the scanner you have assembled so far. Build the lower halves from the dark gray card stock and add the electrical fitting shown above. Once the glue has dried on everything, glue the lower half of the scanner to the upper half. Here is a photo of completed scanners.

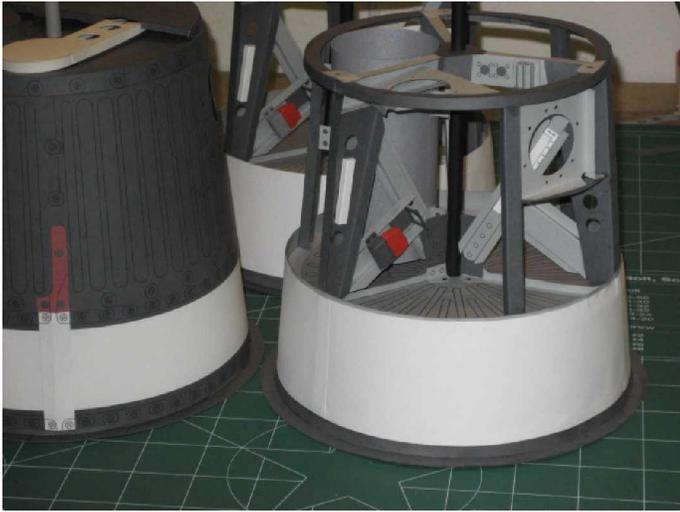


Orientate the seams so they are the least visible and insert the scanners from the inside of the antenna fairing. If you plan to add wiring later, don't glue the scanners in. Use a little tape to hold them for now.

Here are a few photos of the completed model. It's still missing some of the details like the internal wiring, the hinge pin, the drogue bridal, the side scanner retainer bracket. I'll add the details later as I get to them.

You can also see where the Teflon guides (add them if you haven't) were created slightly to simulate the real ones. The red fiberglass tower guides were actually made from a textured paper found at the scrapbook store. They really look good and the photo doesn't do them justice





Well that's all for now. I'll try to add the finishing details in an addendum.

