



Apollo 15/16 plasma, particle, and magnetic field Sub-Satellite in 1/12th Scale



Thank you for your interest and purchase of our forth kit. We have attempted to make the most detailed model that the scale size can support. We hope it will be a fun build for you. The steps are laid out in the order in which we thought would make the best results, starting from the largest and most sturdy parts, to the most fragile parts being last. There are several sub sets of parts that can be done in any order, but the assembly to the body of the spacecraft might cause problems with handling the model during the next steps.

In the assembly graphics you will find the following indicator for the color to paint and where to foil. You may do the painting and foiling at your leisure, but we would suggest doing it at the indicated times.



Silver Paint



White Paint



Black Paint



Light Gray Paint



Silver Foil



Gold Foil

Working with 3D printed parts

While 3D printed parts can be very detailed, as good as regular styrene kit parts, they are also extremely brittle. They will shatter if handled improperly. To remove them from the sprue, or trim any excess plastic from them, it is best to use either a tool specifically designed for the job, such as a Xuron chisel nose tool (see below), or a very sharp blade in a hobby knife.



Painting 3D printed parts can be tricky at first, since the print process for this material involves adding wax support, and then cleaning each model using a hot oil bath. This can leave a slightly oily residue on the models that may prevent paint from adhering correctly.

(Note that this applies to parts printed by third party vendors, such as Shapeways, but not to those printed on our privately owned 3D printer.)

Cleaning the models

Small wax remainders can be cleaned using a toothpick or a cotton swab. The easiest way to de-grease the models is to submerge them into a mild solution of hot water and dish soap. The water temperature should be around 70°C/158°F. Let the parts soak for a couple of hours, the water may turn cloudy as wax and oil separate from your models - you can repeat this process without harming your parts if necessary.

You can also use a degreaser such as Simple Green and warm water. When the model is ready to paint, it will be uniformly white and should no longer feel greasy.

General painting tips

It's highly recommended to use primer before you start painting your models. Ordinary model kit paints can be used, satin and matte paints are best. Mix the paint according to the kit instructions, then apply paint in thin layers, allowing each layer to dry completely before adding another. It's better to apply several thin layers of paint rather than one thick layer.

Assembly

Assembling 3D printed parts is exactly the same as with resin parts. Use a cyanoacrylate glue (Super glue or CA glue) or epoxy. **Zap-A-Gap** medium glue (in the green bottle) is recommended because it is a gel and will not run. If you choose a thinner CA glue, consider using an accelerator.



Applying Foil to the Spacecraft Booms

Refer to Step #4 - #6 in the kit instructions

Applying foil to a small part (such as the booms on the Apollo sub-sat) isn't as straight forward as you might think. To start, you will need some foil cut into strips (ordinary kitchen foil is fine), and a glue that is suitable for the job.

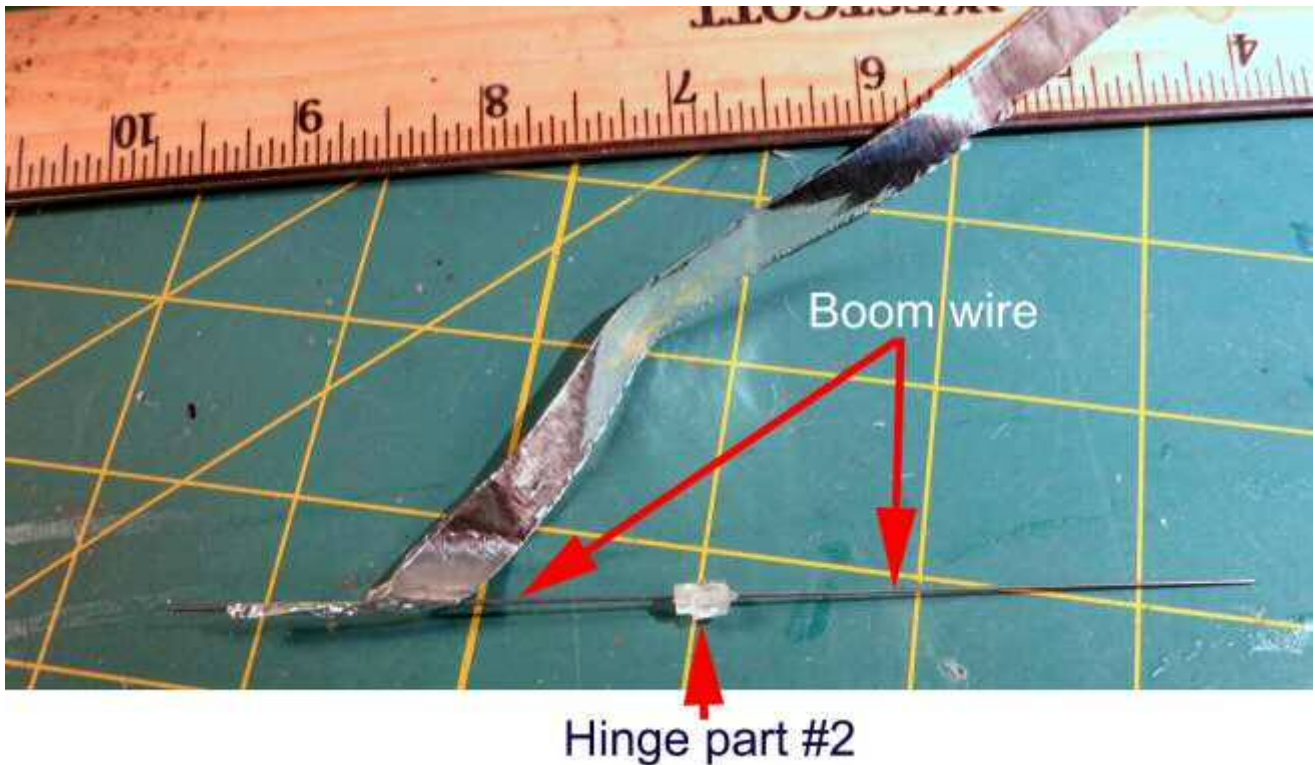


Micro Metal Foil Adhesive is ideal for this, but ordinary white (Elmore's) glue will work

Cut the foil in strips, $\frac{1}{4}$ " – $\frac{3}{8}$ "



Apply the glue to both the foil and the part you are applying the foil to. Wait about 5 minutes, and both surfaces will become very sticky. Then roll the foil diagonally up the boom, until you reach the hinge at the mid-point of the boom.



Here's what the boom looks like with the hinge (part #2) in place midway down the length of it, and with the foil started up the length of the boom. Note that the hinge should be installed before you apply the foil to the boom, as the hole through it isn't wide enough to fit over the boom wire after the foil has been applied to it.

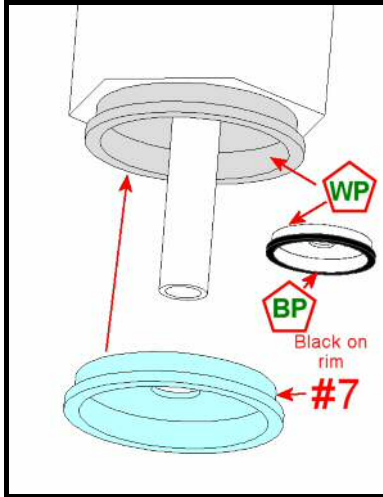
Repeat between the hinge and the end of the boom.



Here is the fully assembled boom. To even out the foil, you can simply roll the boom between your fingers. All that's left to do is paint the plastic parts, glue it in place, and apply gold foil to the part at left (part #3). Note that this is the magnetometer boom. It is the only one of the three booms with part #5 at the end of it. Make sure you glue it in the proper place, as shown in the main part of the instructions. The other two booms will have part #1 on the ends of them.

Step# 1

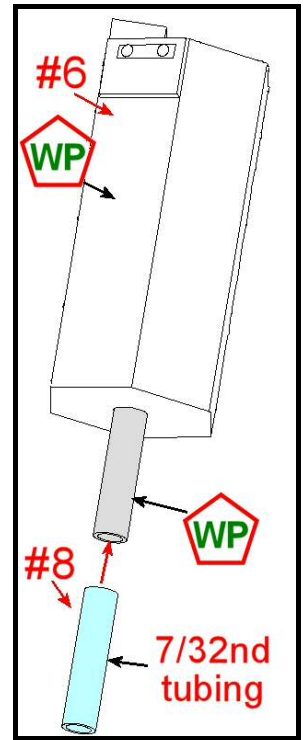
Find the main body (Part# 6) and the small 7/32nd (Part# 8) styrene tubing and glue it in place as shown in Figure# 1. Use very little glue so you do not fill in the pre-drilled hole in the body.



Figure# 2

Step# 2

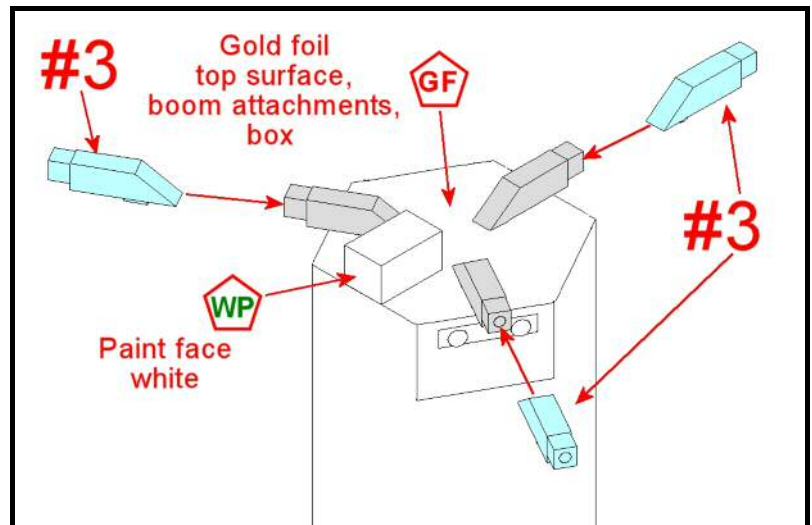
Slide Part# 7 down the antenna tube and glue to the bottom of the body as shown in Figure# 2. Note the majority of Part# 7 is painted white, but the rim is painted black as indicated in Figure# 2



Figure# 1

Step# 3

Find the boom attachment hinges Part# 3 and glue them to the top off the body, as shown in Figure# 3.

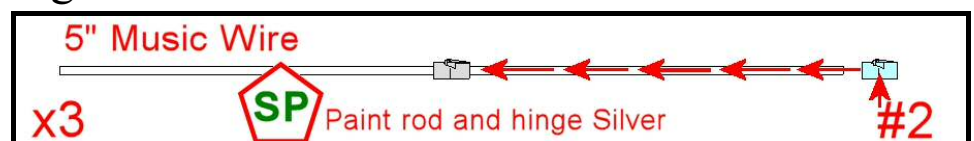


Figure# 3

Step# 4

Slide boom hinge, Part# 2 to the center of all three boom

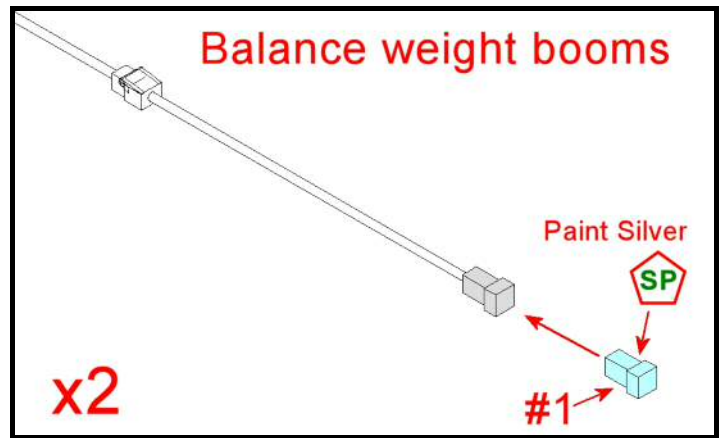
Figure# 4



wires, as shown in Figure# 4. Check foiling options for the booms.

Step# 5

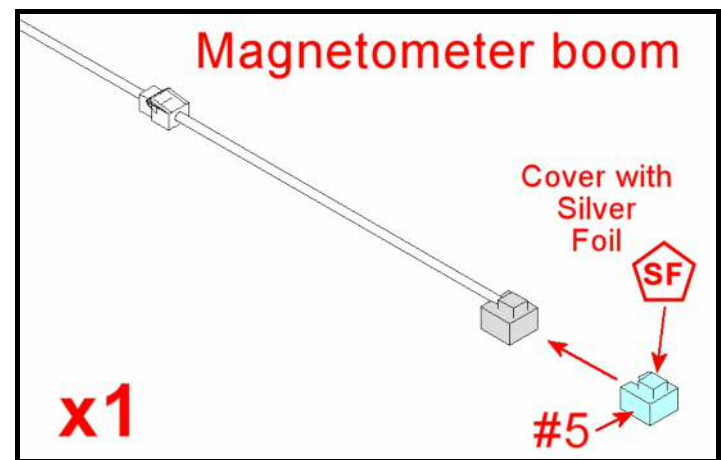
Glue the two boom balance weights, Part# 1, to the ends of two of the booms made in Step# 4.



Figure# 5

Step# 6

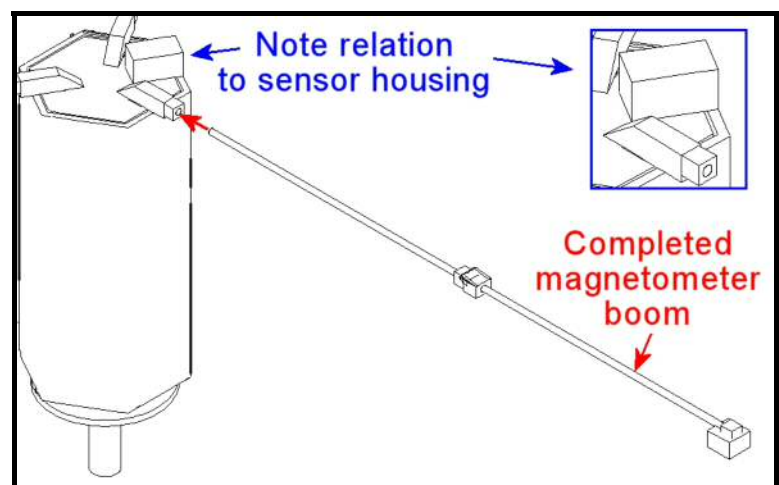
Find the magnetometer head, Part# 5, and glue it to the remaining boom as shown in Figure# 6. Note the orientation of the part in relation to the hinge part on the boom.



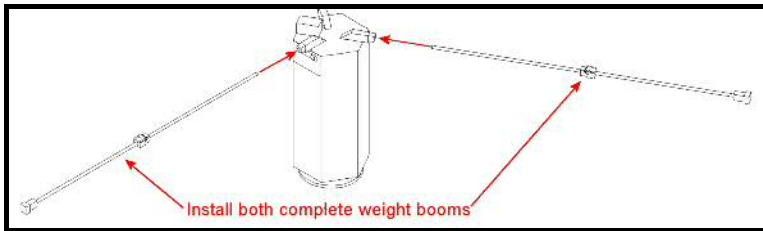
Figure# 6

Step# 7

Find the magnetometer boom made in Step# 6 and glue it to the boom attachment hinge on top of the body from Step# 3. This needs to glue into the Part# 3. Reference this attachment point to the rectangular sensor housing, on the top of the body.



Figure# 7

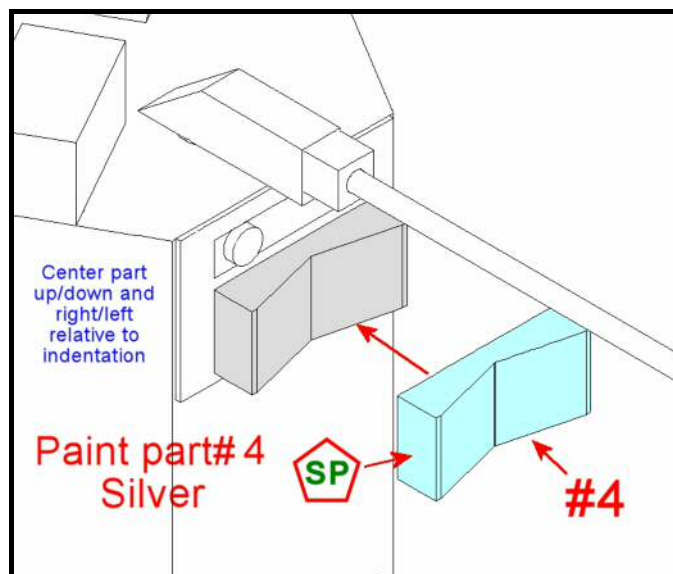


Figure# 7

attachment points on the top of the body, as shown in Figure# 7. All three booms should be 120 degrees apart from each other and straight and level with the top of the model.

Step# 9

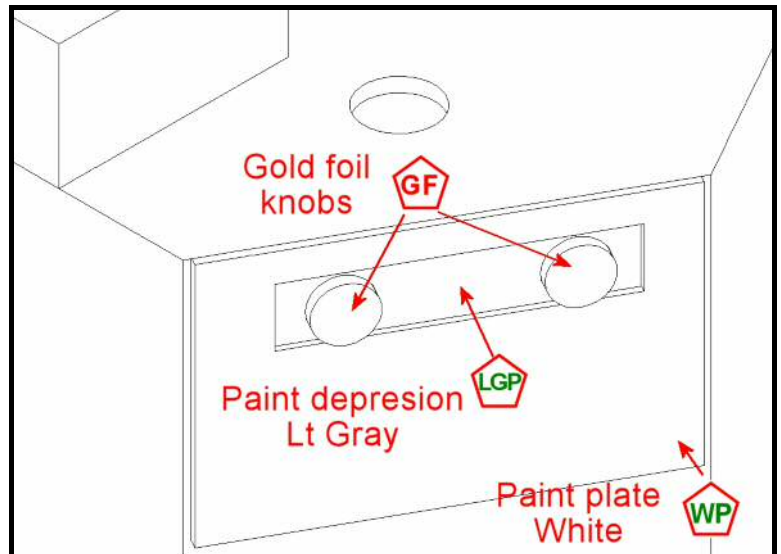
At this point, it would be best to add the included gold/orange foil to the two sensor posts and paint the recess area around them. The next step might make this more difficult.



Figure# 9

Step# 8

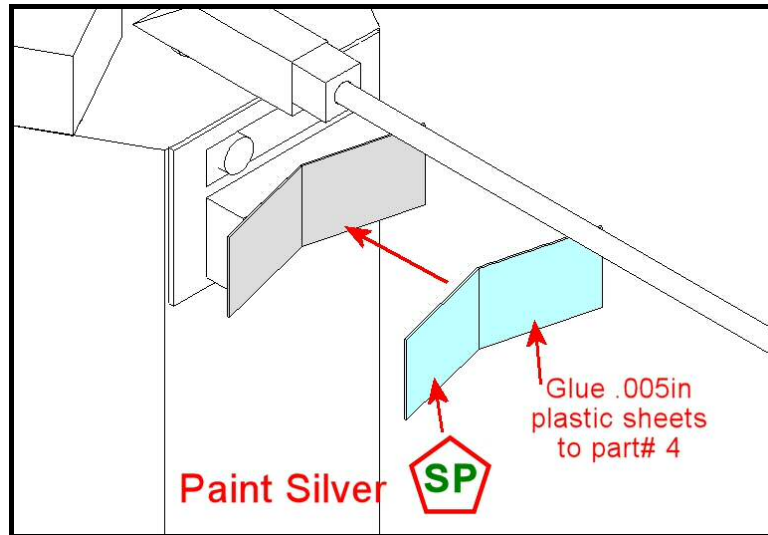
Glue the remaining two boom wire assemblies into the remaining two boom



Figure# 8

Step# 10

Find Part# 4 and glue it on the instrument plate, as shown in Figure# 9, making sure it is centered left to right on the plate and top to bottom from the recessed area and the bottom of the plate.



Figure# 10

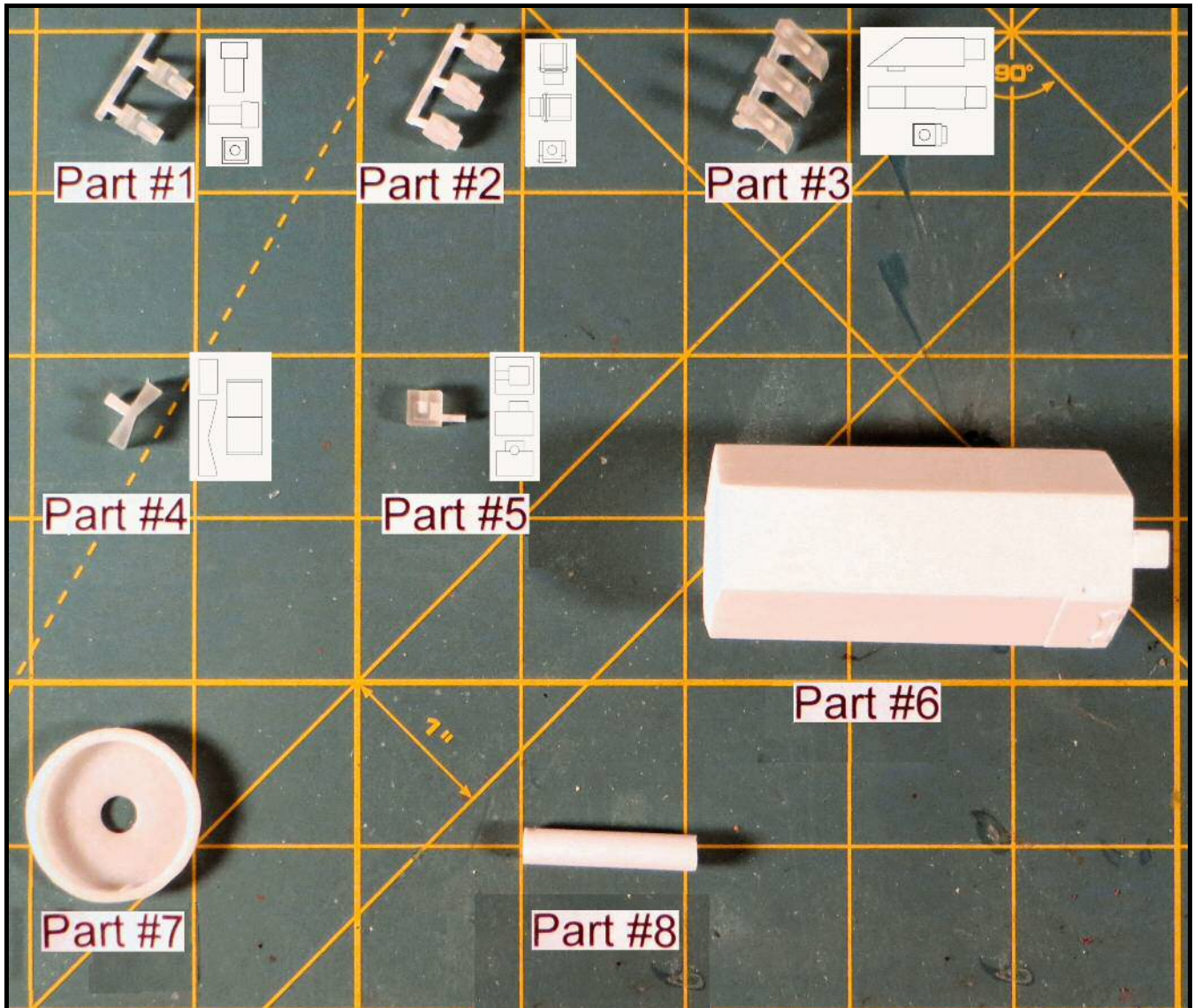
Step# 11

Using the supplied .005 inch sheet plastic, cut a strip that is .6 x .2 inches ($19/32$ in x $3/16$ in) in size. Score a line down the center of the strip so the strip can be easily bent to the shape shown in Figure# 10. Then glue the strip in place as in Figure# 10.

Step #12

Find the $3/64$ " brass rod and the supplied wood base. Glue the brass rod into the bottom of the sub-sat body by inserting it through the white tube (Part# 8, the S-band antenna) and into the pre-drilled hole in the bottom of the spacecraft. We have included a sticker for the base, in case you would like to label the model. Apply the sticker to the base. Then choose a spot where you want to mount the finished model to the base, and drill a hole for the brass rod. Finally, mount the finished model to the base. If you should choose to mount it in some other fashion, that's entirely up to you, the modeler.

Part #	Nomenclature	# per kit
1	Boom weights	2
2	Boom hinges	3
3	Boom attachment hinges	3
4	Sensor Base	1
5	Magnetometer head	1
6	Main body	1
7	Mounting Ring	1
8	7/32" tubing (S-band antenna)	1



Part Identification Image

Additional Parts

Booms = music wire 5"	3
Gold foil	1 sheet
.005" styrene sheet	1
Base + Labeling Sticker	1
Base mounting wire 3/64"	
brass rod	1
Decals	1 sheet