

*Eika*

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Present the

# **Cassini**

# **Spacecraft**

# Assembly

# Instructions

by

Space Cadet Models  
in 1/24th Scale

Decals by

Jbot Decals

Vacuum Forming by

RealSpace Models

Thank you for your interest and purchase of our third 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.

Please look though the full set of instructions before you decide on the order of assembly that you are going to follow. Steps that must be done before or after other steps will be noted as this text, with a pink background. This is due to some very tight tolerances of the real spacecraft. When reduced to 1/24, they got very, very tight. If you do these steps out of order, it might not be possible to continue without trying to backup a step or two.

We would also suggest applying foil to the parts before installing them, and leaving a little excess to help merge the part's foil into the foil next to or under the part. You, of course can foil it at any time you wish, but as more and more parts are added, the process will get much more difficult.

We have included several parts that are for optional ways of displaying your model. They will be noted by text that has a blue background. You will need to make decisions at these points in the assembly as to how you would like the final model to look.

We would like to thank Erika McGinnis, for the original artwork on our instruction's Cover Page. <http://www.erikamcginnisart.com/>

# CASSINI FOILING AND PAINTING INSTRUCTIONS

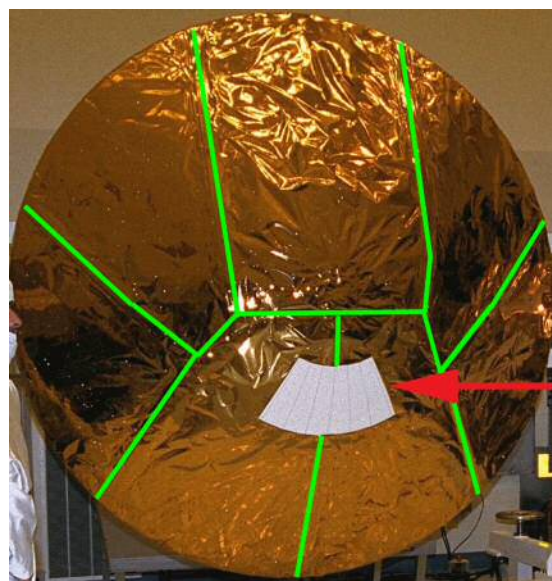
## Foiling:

It is important to understand that this model was designed to show the spacecraft in its' flight configuration. Generally the entire spacecraft is swathed in gold multi-layer insulation (MLI). The MLI is nearly flat (not wrinkled or crinkly) on the larger panels of the spacecraft bus. On smaller panels it appears wrinkled, and in very small areas it appears crinkled.

There are several sections of black foil on the spacecraft:

- 1 large semi-rectangular MLI panel on the spacecraft bus, covering the monopropellant tank.
- The three RTG shades are covered in black MLI
- The main engine cover was made of black MLI
- The magnetometer boom is covered in black MLI with some small gold sections
- The fields and particles pallet is covered in black MLI

Although many of the artists' concepts of the spacecraft show the latter two sections covered in gold MLI, after thoroughly researching this, we believe these areas were



Radiative Window  
- White -

Figure 152

covered in black MLI.

The MLI covering the Huygens heat shield is gold. It was applied in 7 sections with visible seam, see Figure 152 on the previous page.

In general, there is no MLI on the high gain antenna, or on the main engine assemblies.

## **Painting:**

In general the high gain antenna assembly is all white, either matt or semi-gloss.

All radiators around the circumference of the top of the spacecraft bus are chrome silver, except the shunt radiator (see below). The non-radiating parts of these (where there are no louvers) are covered in gold MLI.

The shunt radiator is white with black edges, and there are decals included with the kit to show the holes in the flat surfaces of it (front and back) for reference see Step# 133 on page 66.

All of the struts that connect the various parts of the spacecraft to the bus, including the Huygens aeroshell, are covered in gold MLI. The only exception to this are the struts that connect the shunt radiator to the spacecraft bus, which appear to be bare metal or some type of composite material (dark tan).

There is a white section of the heat shield of the Huygens aeroshell, see Figure 152 where there is no foil, called the “radiative window”. Under the MLI, the heat shield was comprised of tiles which were varying shades of a brownish-maroon color. The back cover (top) of the aeroshell was aluminum, also covered with gold MLI on the exterior, if you decide to show it this way, there are reference

imaged on the included data disk.

The mirror inside the CIRS telescope was gold see Step 63. Some images show it as an orange gold, others as yellow gold.

The inside surfaces of the CDA are gold see Step 38. As for the CIRS mirror, the shade is left to your desecration. Images of the instrument are on the included disk to help you decide.

All radiator panels, depicted with the PE parts 2b, 2i, 2j, 2k, 2l, 2m, 2n and 2p, are white.

## **PAINT and FOIL LEGEND**



Black Foil



Black Paint



Copper Paint



Dark Grey Paint



Gold Foil



Gold Paint



Light Grey Paint



Silver Paint



White Paint

Look for paint and foiling icons in Figures associated with the step you are currently doing, or for parts you are getting a head start on.

# **3D PRINTED PART PREP AND PAINTING** **INSTRUCTIONS**

## **Part Prep:**

If there is any residual oil or wax support material left over from the production process, this can easily be removed using Simple Green solvent. You can simply dip and air dry the model. Or, using a paint brush, you can lightly spread the solvent on the part, rinse well with water and air dry. **PLEASE NOTE- Several of the parts have been printed using resin that can have minor deformations fix by using a heat gun/hair drier or immersing in hot water. This will make the resin flexible so that it can be gently bent or flattened as needed. This is the recommendation of our caster/printer sub-contractor.**

## **First Coat - Prime:**

Primer is added as a first coat in order to provide a uniform surface and offer a stronger hold for your paints. Recommended primer colors include black, grey, or white. Your primer color selection will depend on the colors you decide for your top coat.

In order to keep the finest details visible, it is best to use a thin primer. For example, Krylon Color Master Primer will do the job.

## **Paint:**

Parts can be painted in a variety of ways. The most common methods for painting a high-detail finish include airbrushing and hand-painting.

Airbrush painting is a great method for coating large areas. This will require a fine-tip sprayer kit and masking to cover the areas that are

not intended to be painted.

Hand-painting might be a bit more accessible to those who don't want to invest in an airbrush kit. For this method, a range of small-sized synthetic brushes are recommended. The synthetic hairs do not fray, have a longer life span, and allow for finer points due to their stiffer structure.

With hand-painting, we suggest using acrylic or enamel model paints. First, we add the larger base details using a larger brush. Then, with a smaller brush, we use the lighter colors to make the details pop. Once painted, we'll let the material dry completely before moving on to the next step.

### **Clear Coat:**

The final step to finishing the parts is to add a clear coat. This will seal the paints and offer the appropriate sheen. Choose a matte or satin finish depending on your glossiness preference.

# SPECIAL NOTE



When covering Part numbers 4, 54, 59, 66, 67 and 68 with Foil, please note that they all have indentations, as shown in Figure 151. It is recommended that you press the Foil down into the depressions so they are visible. They show where thermal louvers and radiator panels should be glued onto the parts as shown in later steps.

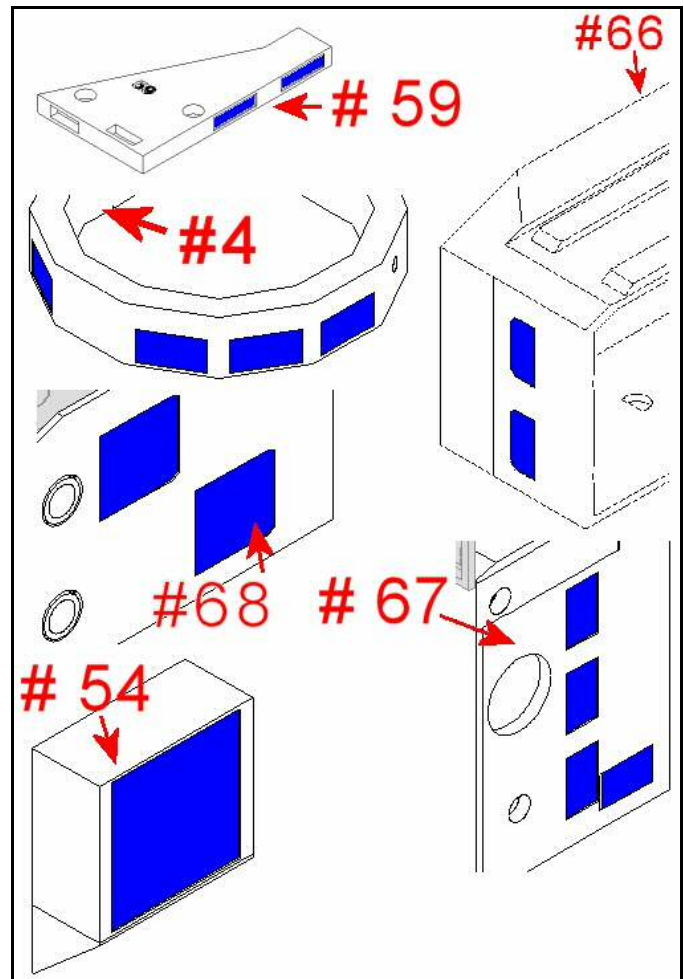


Figure 151

In Step 71, during testing, we found that due to the limitations of 3D printing resolution, Tool 1 does not hold onto the PE fins tight enough. We suggest applying a light coat of rubber cement onto the fingers of Tool 1 and into the spaces between the fingers. Allow the glue to dry before continuing. Once dry, slide the PE fins into the slots, the rubber glue will allow the Tool 1 to hold onto the fins as needed for the next steps. When Tool 1 is removed, there should be no or very little of the rubber cement left behind. Remove any rubber residue that is left behind. If you decide that this method of making the fins is more than you would like to tackle, we have provided an optional part #110 to use that accomplishes Steps 71 through 75.

## STEP #1

We have included parts for a way of mounting your model during and after assembly. These parts are glued inside the body tube to provide a stop for a 1/4 inch rod to be inserted through the bottom of the body and have the top of the rod rest in this holder. Find part number 6 and number 7. Glue part 7 into position as in Figure 1. We would suggest using a very

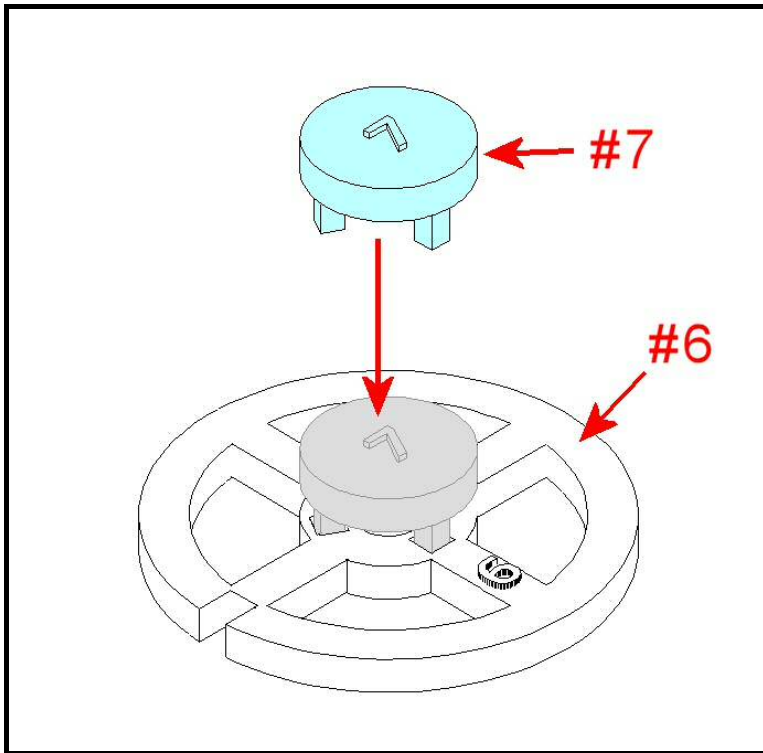


Figure 1

strong glue like JB Weld or some Gorilla Glue. This is suggested as this part assembly will be holding the full weight of the completed model, when done, and will be impossible to fix if it breaks loose.

## STEP #2

Find body tube, part number 2, and make sure all holes are clear of flash or resin. Drill out with a 1/8th inch drill if needed. Please note the position of the holes in the tube, and that it is held in the shown orientation. When in the correct orientation the part number "2", inside the tube should be upright. Now glue the assembly from Step #1 into the tube as shown in Figure 2. You will note that there is an

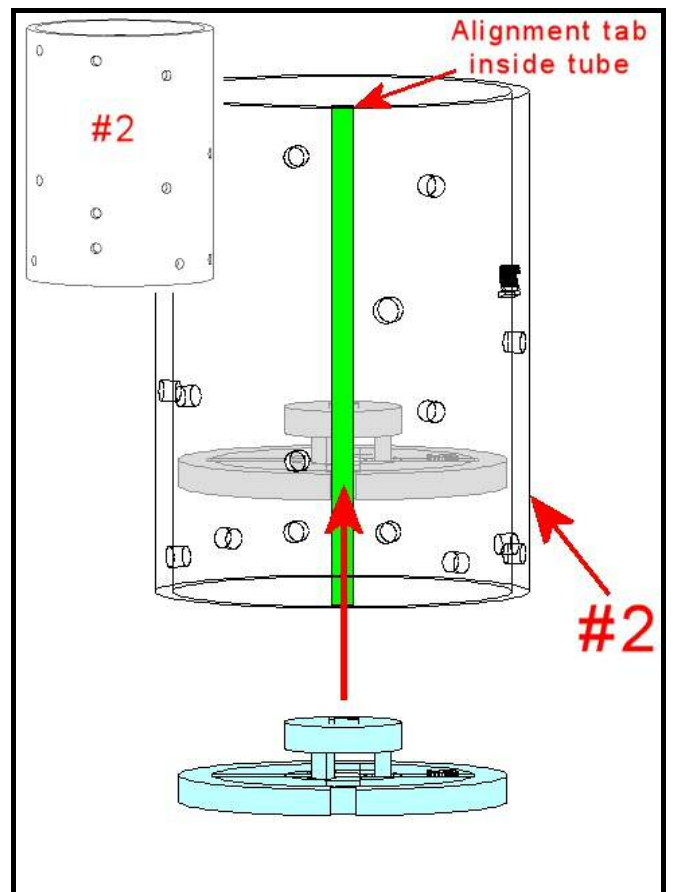


Figure 2

alignment tab inside the tube and that the assembly has a notch in it that will fit the tab. Place the assembly about an inch into the tube, but make sure it does not cover any holes in the tube.

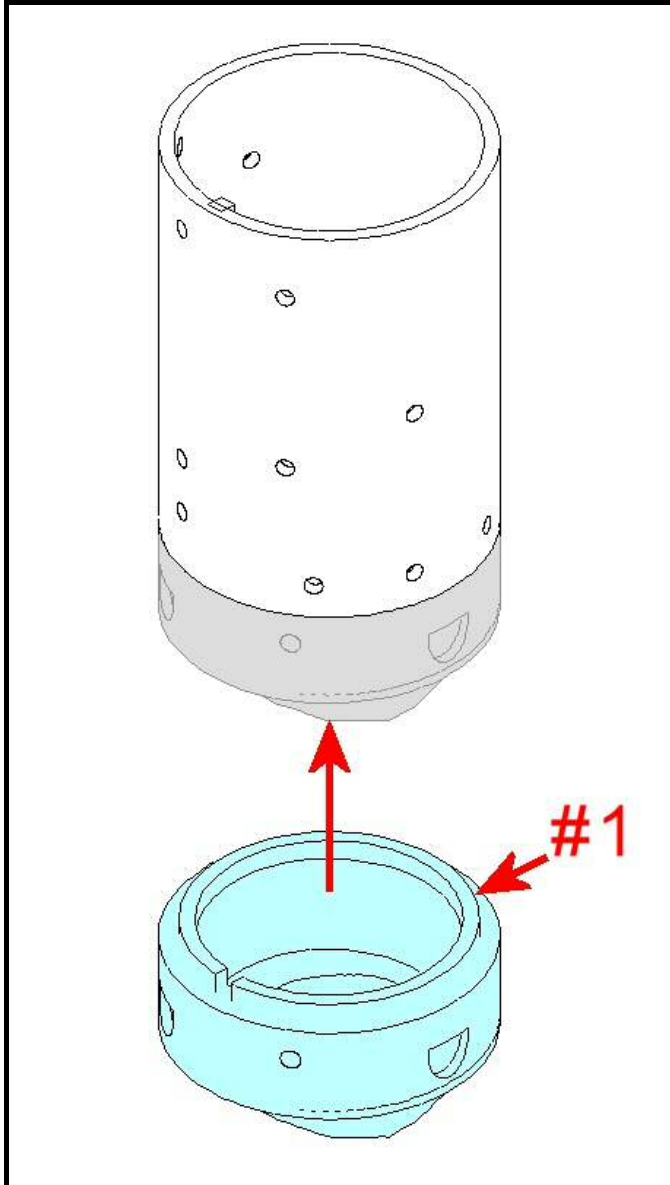


Figure 3

alignment tab is placed in the notch on part number 1's mounting ring.

### **STEP #4**

Before starting this step, please make sure not to trim off the alignment tabs on part #3. See Figure 5

### **STEP #3**

Next, find part number 1 and glue it to the bottom of the assembly finished in Step #2. Be sure the

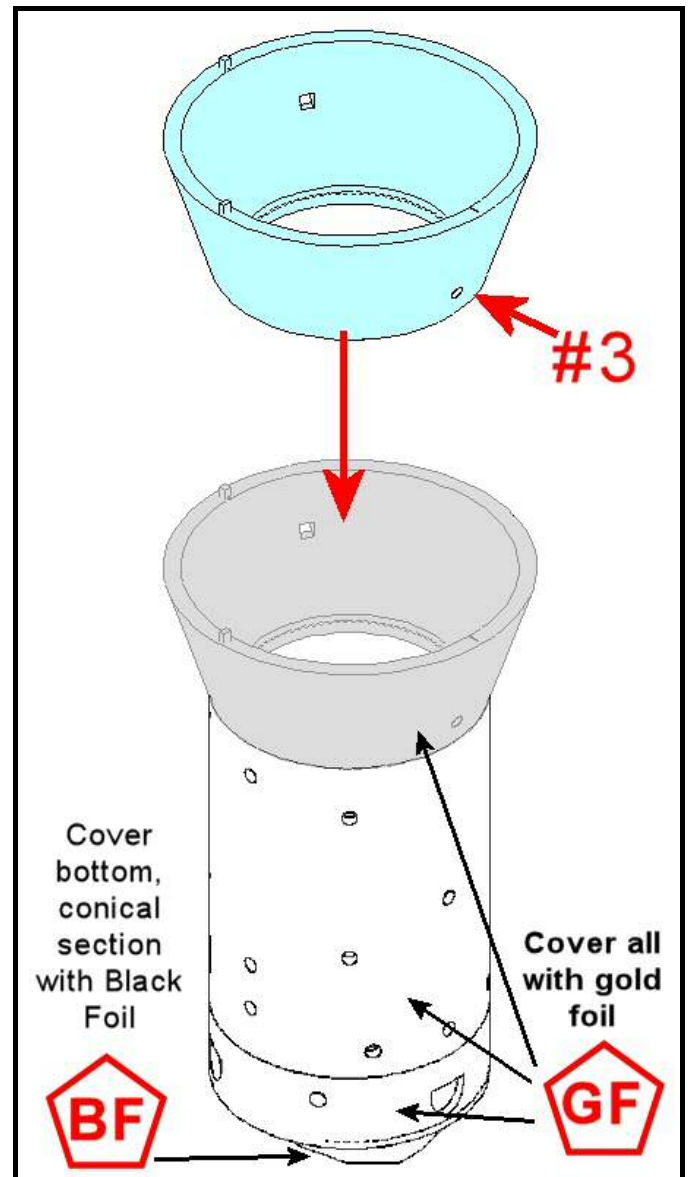


Figure 4

Glue part number 3 to the top of the body tube assembly. Make sure the mounting ring notch aligns with the body tab.

## **STEP # 5**

In this step you will glue part number 4 to the top of the assembly completed in Step #4. Please note that part number 4 has two notches in the bottom, inner corners. Align the part with the holes in the inner and outer walls facing away from you and the notch below the holes aligned with the tab on part #3. In this position, there

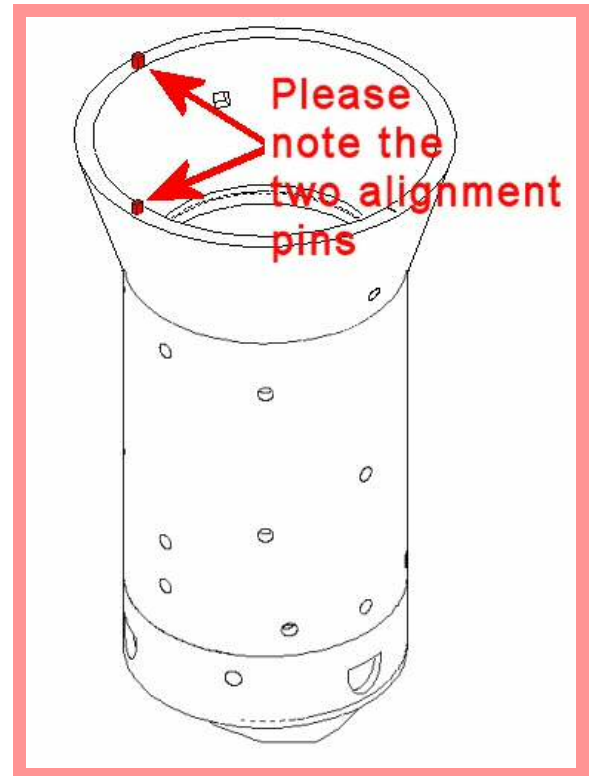


Figure 5

will be a second notch to the left that will glue over the second alignment tab. Make sure the tabs fit into the notches all the way. This not only aligns the body to the proper axis, but centers the body on the top of part number 3.

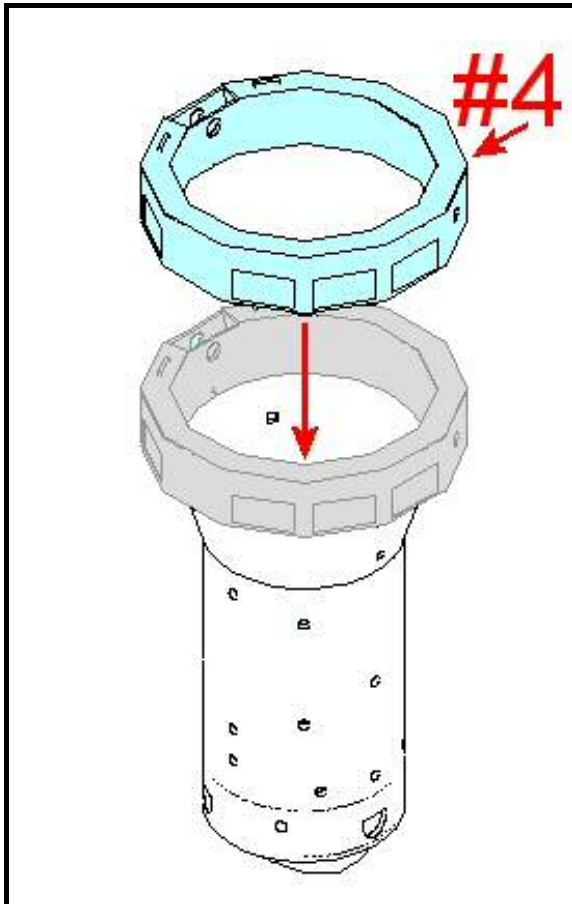


Figure 6

## **STEP #6**

Now find part number 5. This is a small part that closes the hollow part of the bus. Part number 5 should have a slot in the center of the part. If this slot is obstructed with flash or resin, please use an x-acto knife to clear out this slot. It will be needed later in the build. Now glue part

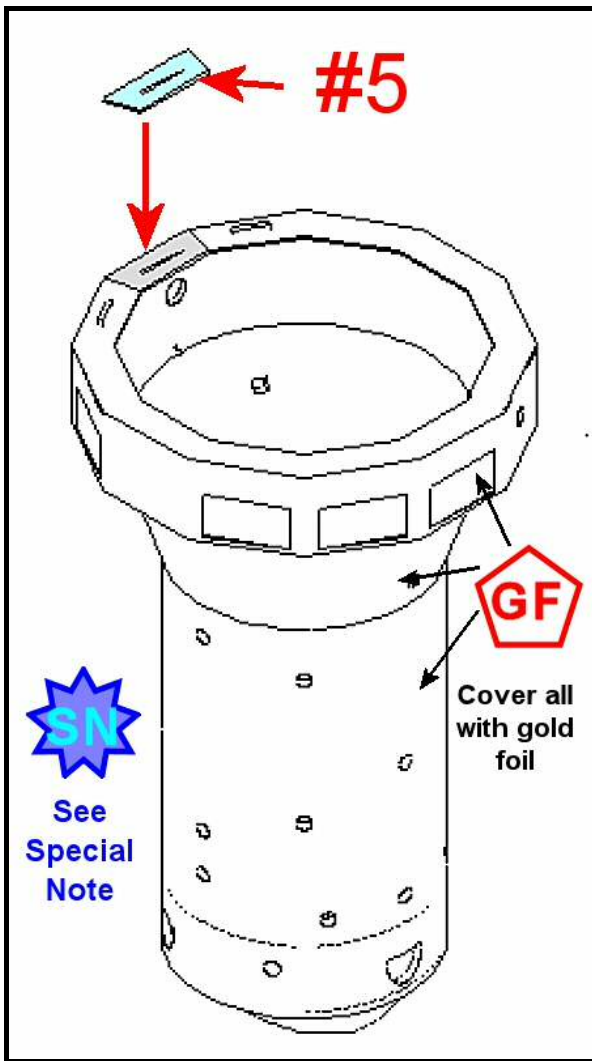


Figure 7

After test fitting one part 13, one part number 14 and part number 8. Note the location of all the holes in the image of the body as shown in Figure 8. Part number 8 will only fit in one place, due to the spacing of the pins on it. The thruster arms are positioned to either side of part number 8 as in Figure 8.

number 5 to the top of the bus, as in Figure 7, in the alignment that is noted.

## STEP #7

In this step you will be adding two of the thruster arms and the Monopropellant tank to the body. It is highly recommended to test fit the parts before gluing. Part number 8 has two notches that fit over the thruster arms. These notches might need a little sanding to allow all three parts to fit smoothly and flush with the body.

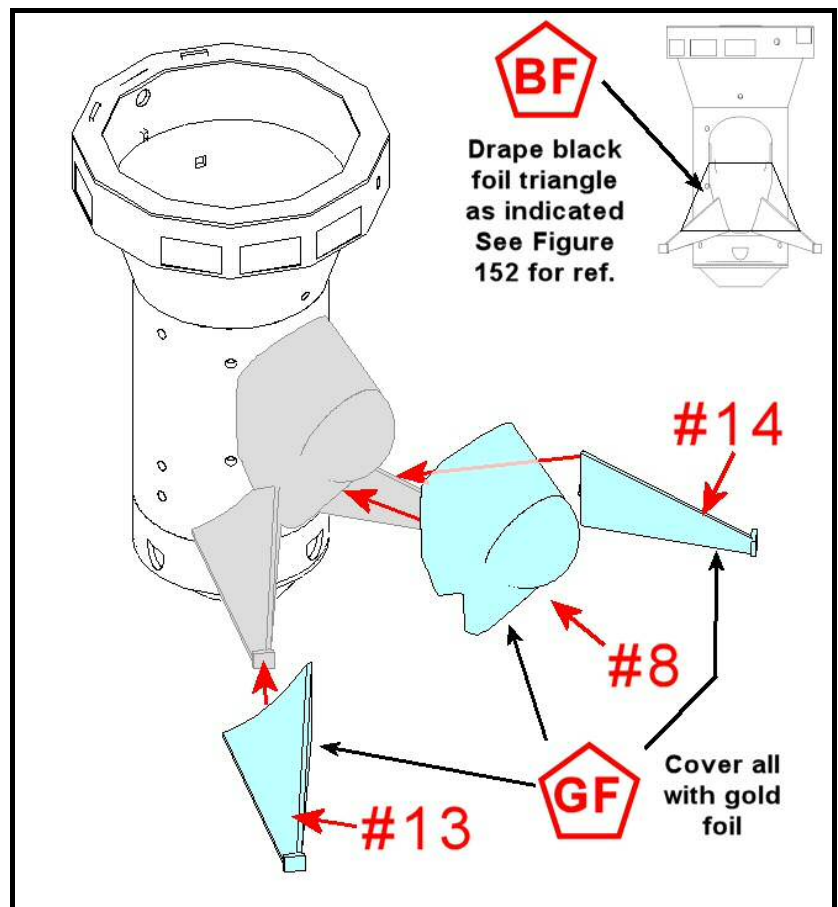


Figure 8

## STEP #8

In this step you will be adding the other two of the thruster arms and the Helium tank to the body. It is highly recommended to test fit the parts before gluing. Part number 9 has two notches that fit over the thruster arms. These notches might need a little sanding to allow all three parts to fit smoothly and flush with the body.

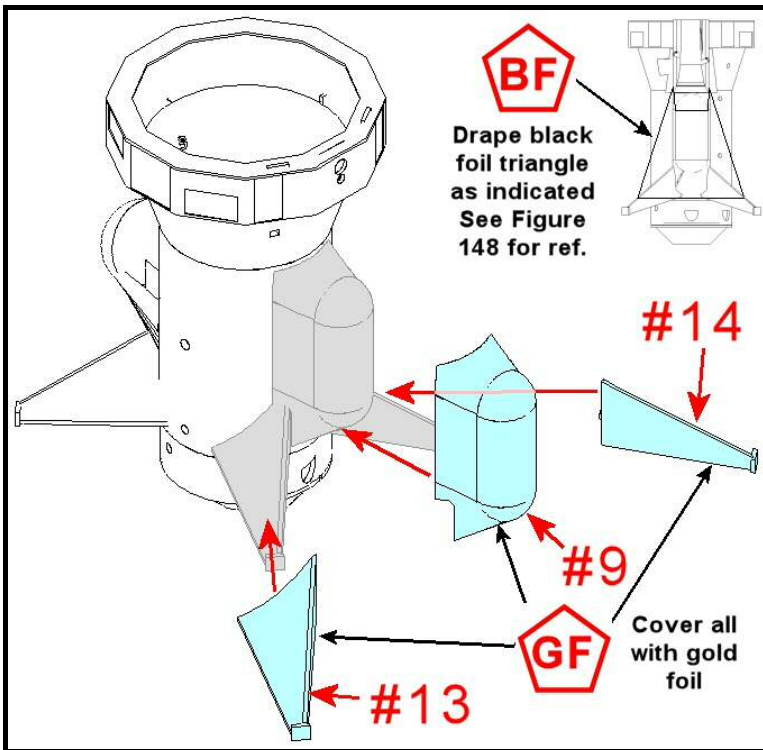


Figure 9

After test fitting part numbers 13, 14 and 9, glue them to the body. Please note that they are directly below the hole and slot in the bus. The helium tank will only fit in one spot due to the pins on its back.

## STEP #9

In this step glue the Propulsion Isolation Assembly, part number 11 into position as shown in Figure 10. The bottom edge will butt up to the thruster arm and the side will cover part of the Monopropellant tank.

## STEP #10

Find part number 12, the Pressurant Controls, and glue

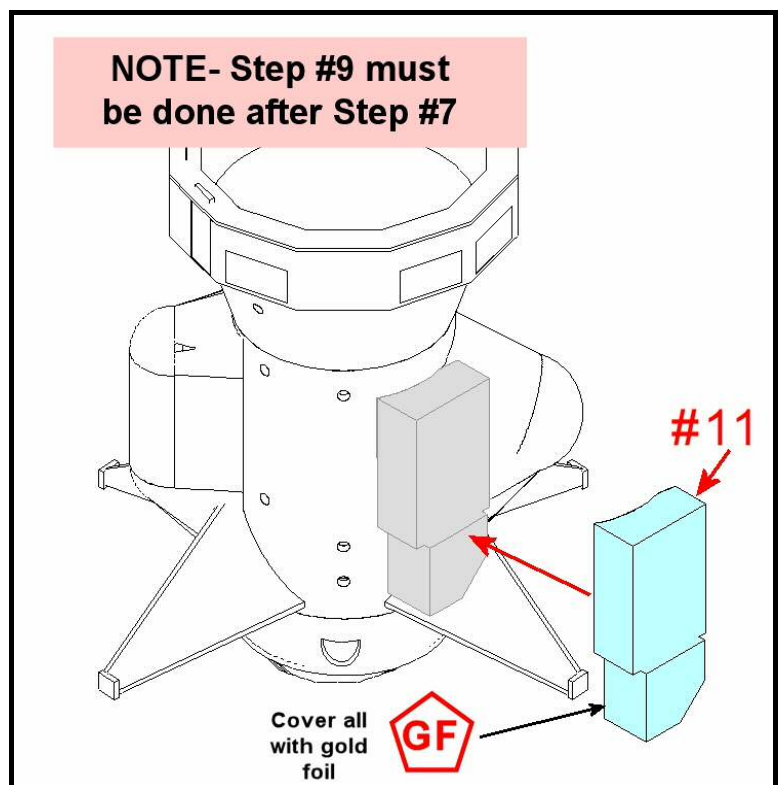


Figure 10

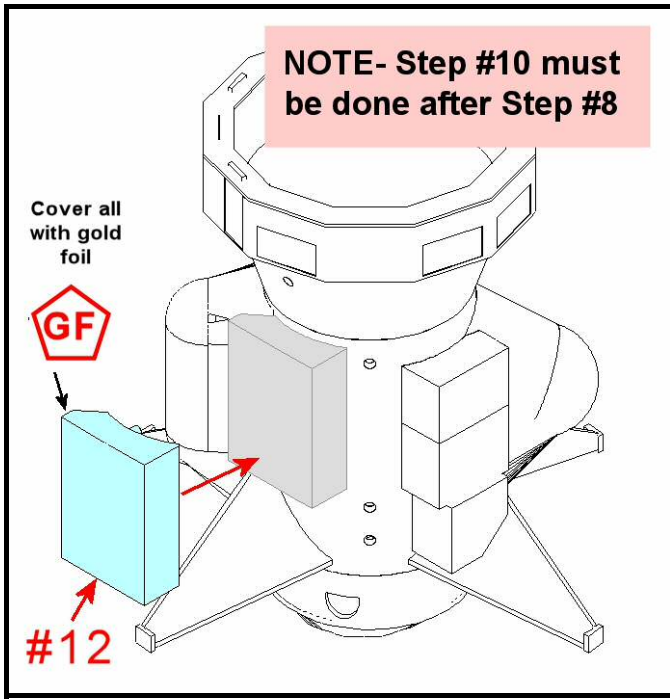


Figure 11

## STEP #12

Although you will not need them for awhile, you can assemble the two motor bells and set them aside. Glue part number 26 to

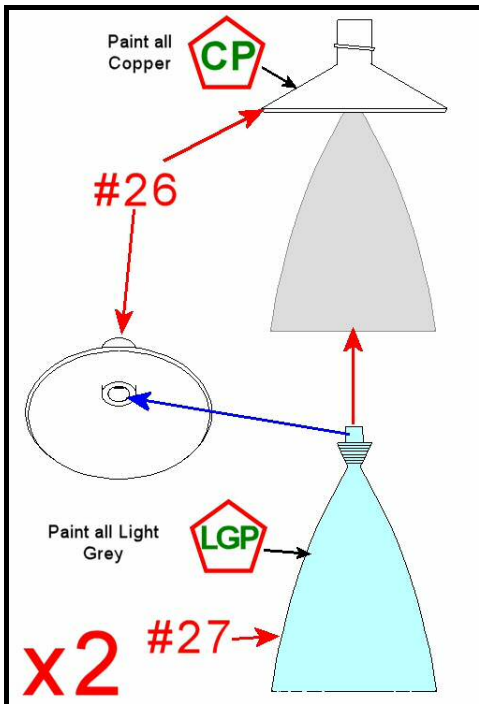


Figure 13

the top of part number 27 and do this twice as shown in Figure 13.

it into place as shown in Figure number 11. Part number 12's left edge will cover part of the Helium tank.

## STEP #11

The Propulsion Module Electronics Assembly, part number 10 is glued into the position shown in Figure 12.

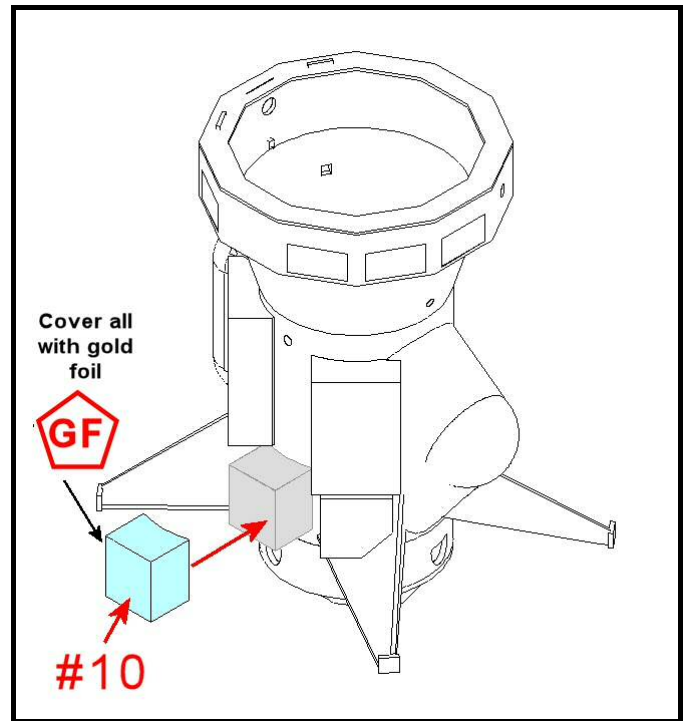


Figure 12

If you decide to depict the spacecraft with the engine cover closed, you do not need to do STEP #12.



toward you. To finish the installation of the engine covers find the half moon disks on PE sheet 3 part “c”. Glue them to both sides at the pivot point of part 29a or 29b depending on if you chose open or closed.

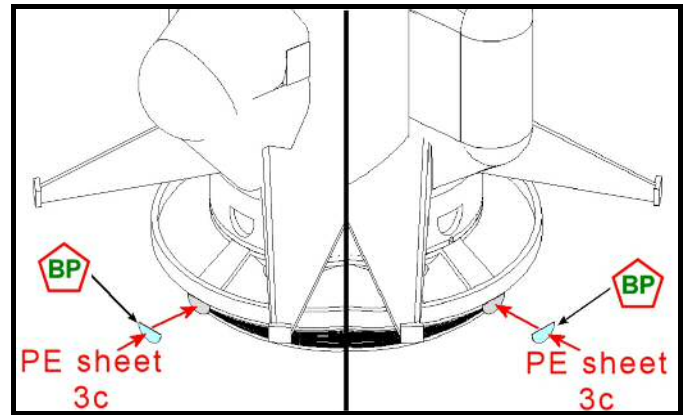


Figure 16

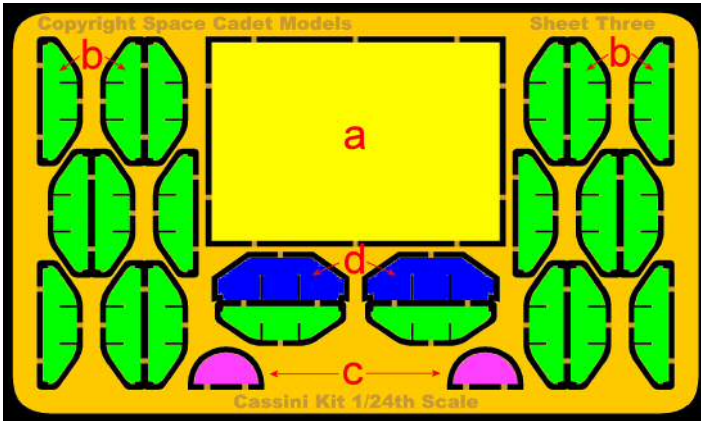
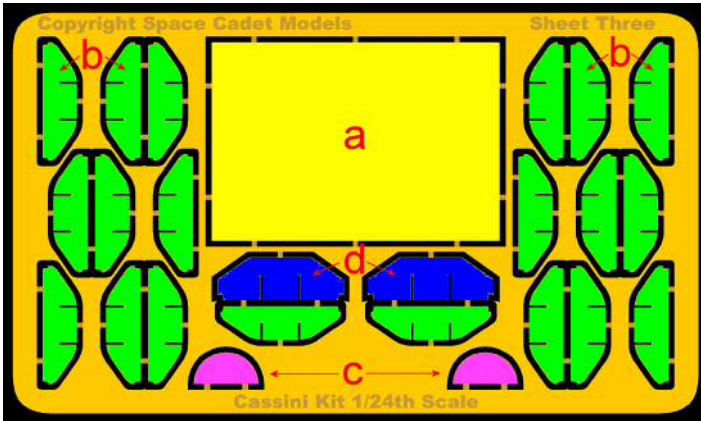


Figure 17



PE Sheet 3

## STEP #16

Find part number 53, Magnetometer Boom Mount, and glue it to the side of the 12 sided bus and body cone. You will find a hole on the bus face that is directly below the slot in the top of the bus. It is suggested that a strong glue is used here, as this part holds the long magnetometer boom to the model. There are other anchors that will be installed later, but this is the foundation to all of them.

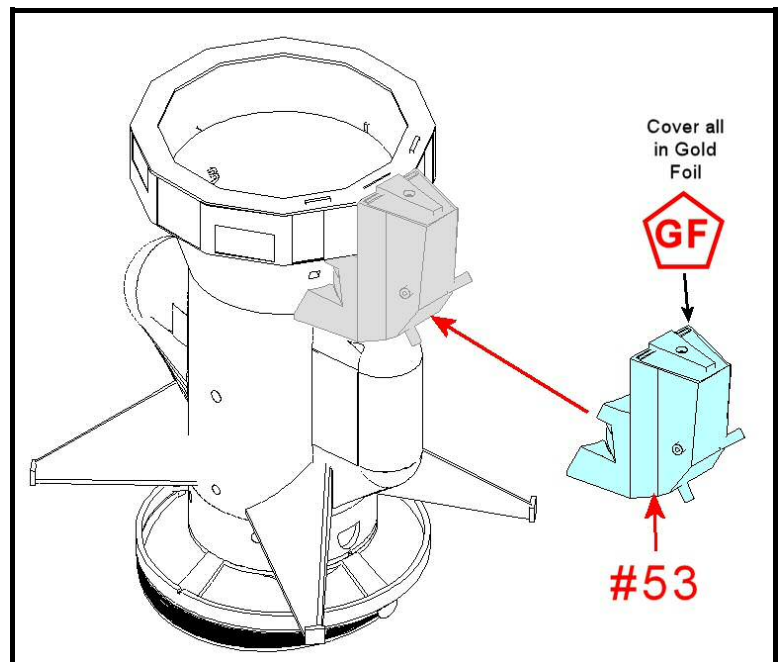


Figure 18

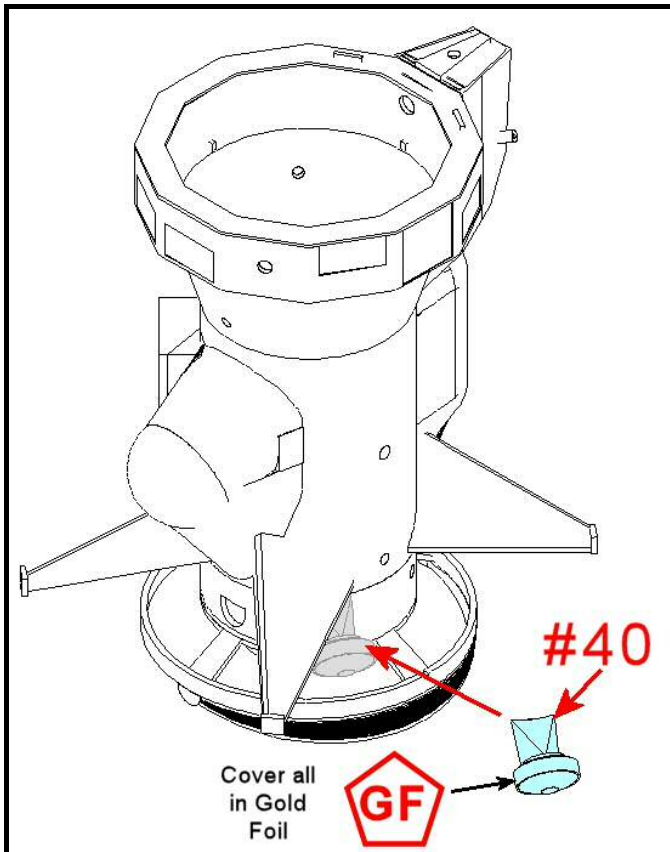


Figure 19

## STEP #17

In this step we start mounting the momentum wheels. Find part number 40 and glue it into position, as shown in Figure 19. Please double check that the orientation of the model matches the drawing before glueing. The mounting base has a curved surface. Placement is correct when the curved surface fits snugly to the bottom of the body, and the momentum wheel angles downward.

## STEP #18

Find Momentum Wheel number 108 and glue it into position, as shown in Figure 20. Again make sure the curved surface of part number 108 glues flush with the surface of the bottom body, with the momentum wheel angling downward.

## STEP #19

This step mounts the last momentum wheel that is at the bottom of the spacecraft. Re-orient the body to look like the

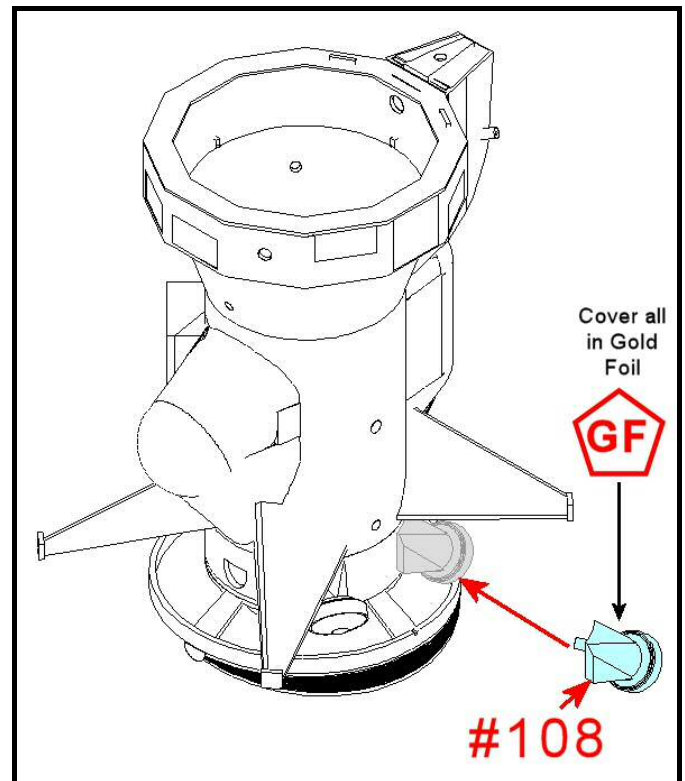


Figure 20

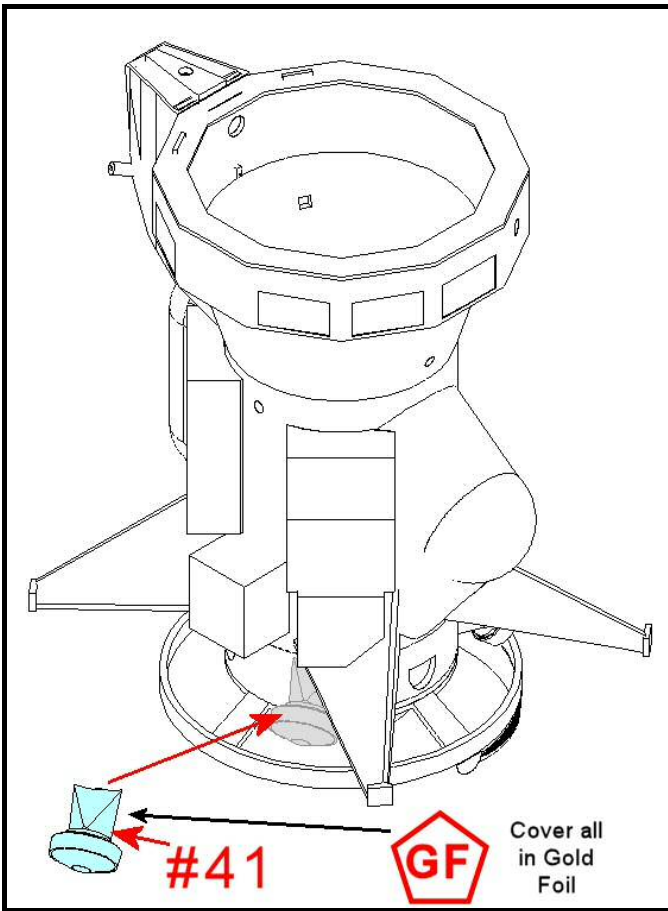


Figure 21

drawing in Figure 21. Find part number 41 and glue into place as shown in Figure 21. Again, the part has a curved mounting surface that should be glued flush with the body, and the momentum wheel should angle downward.

## STEP #20

Find part number 65, the mounting base for the main instruments pallet. Keep the body oriented as in Figure 22 and test fit the part number 65 in the position shown in Figure 22. The part has an alignment pin that should fit into the hole in the body between the

two boxes already glued in place in Steps 9 and 10. The mounting base will rest on the top of part numbers 11 and 12. If part number 65 does not fit well sand and/or trim to allow it to fit in place. Once the fit is OK, glue into place, flush with the body.

## STEP #21

This step mounts the last momentum wheel, part number 42. Test fit the part in the position and orientation as shown in Figure 23. It should mount with the curved base fitting flush with the curvature of the upper body.

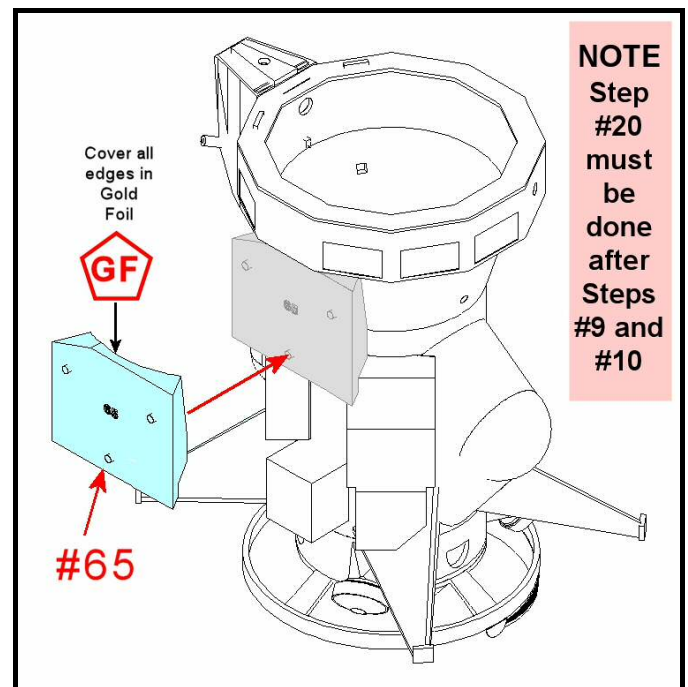


Figure 22

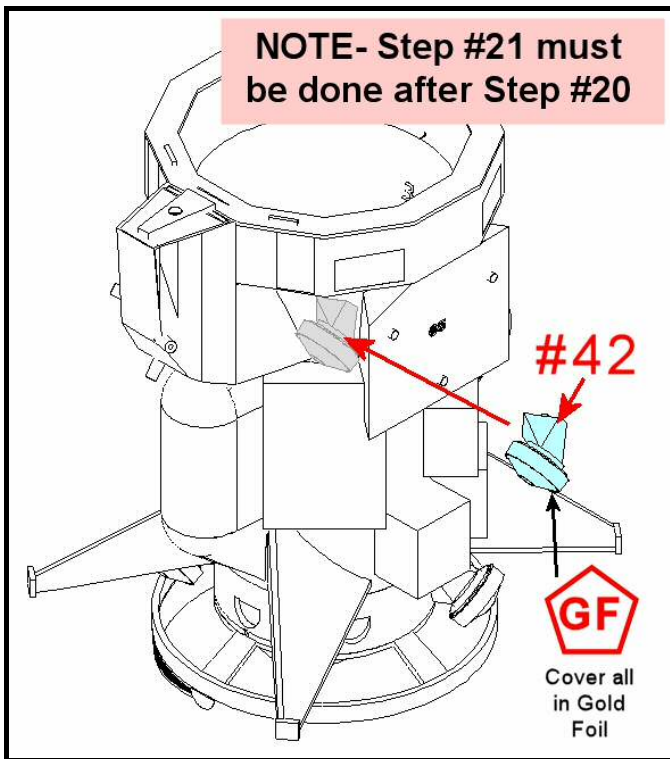


Figure 23

The Blue arrow pointing to the red indentation in the body shows the placement for the third RTG. This must be left to a later step.

## STEP #23

Find part number 104, this is the magnetometer boom canister. Glue this part to the top of part number 53 that was placed in position in Step #16.

This position is shown in figure 25. We would suggest using a strong glue, as this part will be under stress from the weight of the magnetometer boom.

Glue part 42 into place, when fit is confirmed.

## STEP #22

Find part number 39a, RTG mounting bases. There are three of these part, but two are identical while the third one, 39b has the center "D" tab rotated. Glue part numbers 39a into place, directly below the two large fuel tanks, as shown in Figure 24. This places them 180 degrees apart from each other.

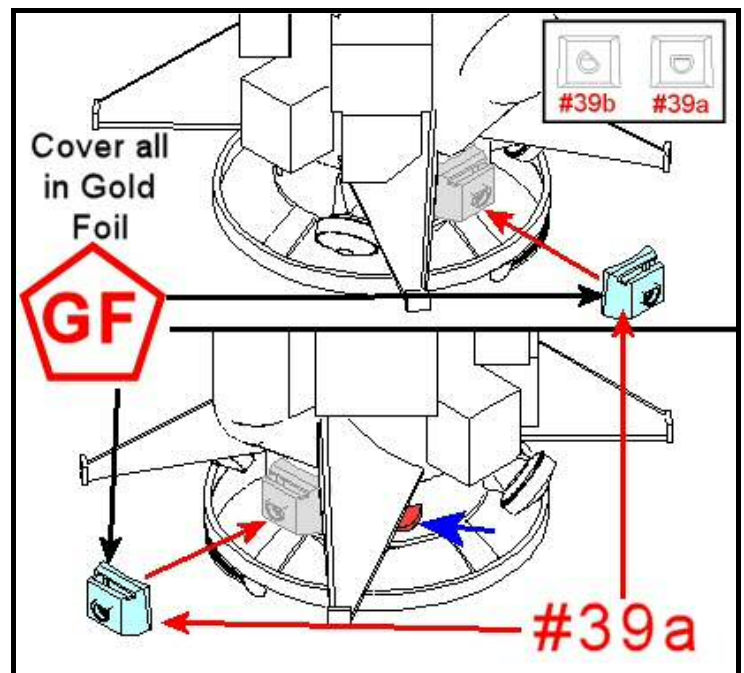


Figure 24

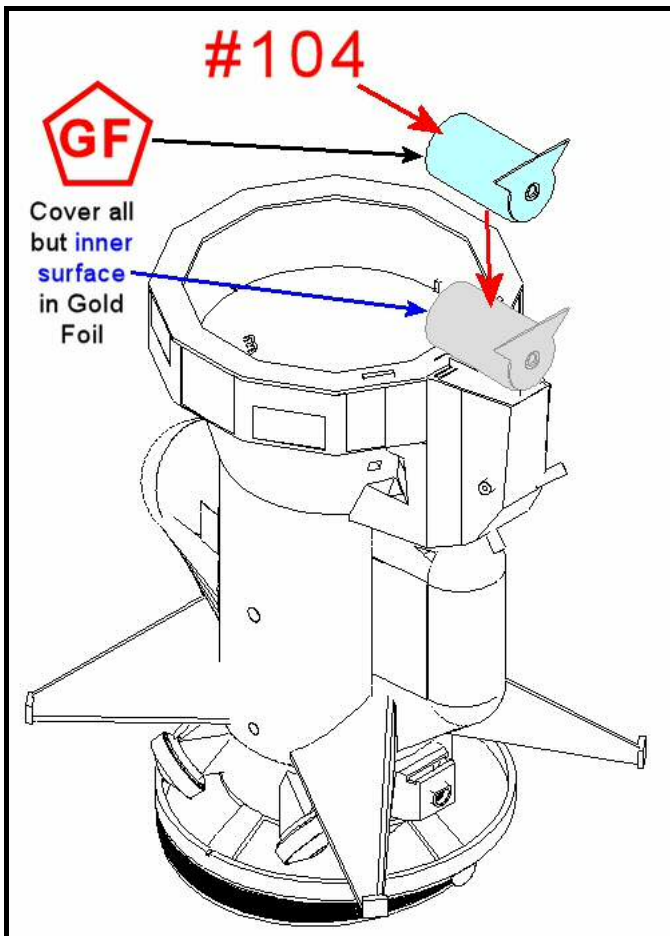
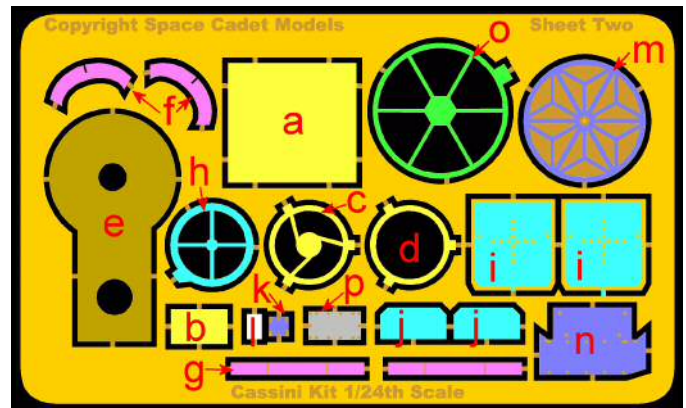


Figure 25

## STEP #24

Find part 57 and PE part 2e from the PE sheet 2, as shown in figure PE Sheet 2. Also find the short, approximately .4 inch 3/16th inch tube that comes with the kit. The purpose of this step, besides



PE Sheet 2

mounting the first part of the magnetometer boom, is to provide a firm anchor for the boom. This will resist the boom's weight from twisting the boom canister off the spacecraft body. Part number 57 has a 1/8th inch tube molded into the part. Part number 104, the boom canister, has a 3/16th tube molded into it. Slide part number 57 into the canister, as shown in Figure 26. Temporarily use the other boom parts to make sure part number 57 is rotated to match up with the rest of the boom smoothly. A small part of 57's tube will stick out the back end of the canister. Slide PE part 2e, through the slot in the bus top surface and let the small hole in

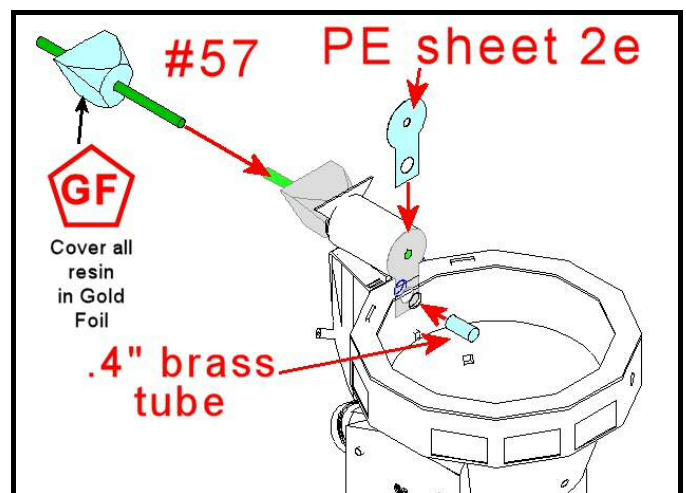


Figure 26

the round end fit over the protruding end the tube. Glue this to the back surface of the canister and the rod end. Do not use too much glue on the rod end as the canister cap will not fit later. Now take the small 3/16th inch tube and glue it into the hole in the bus and through PE part 2e. This will anchor the boom when it is all in place. See Figure 26.

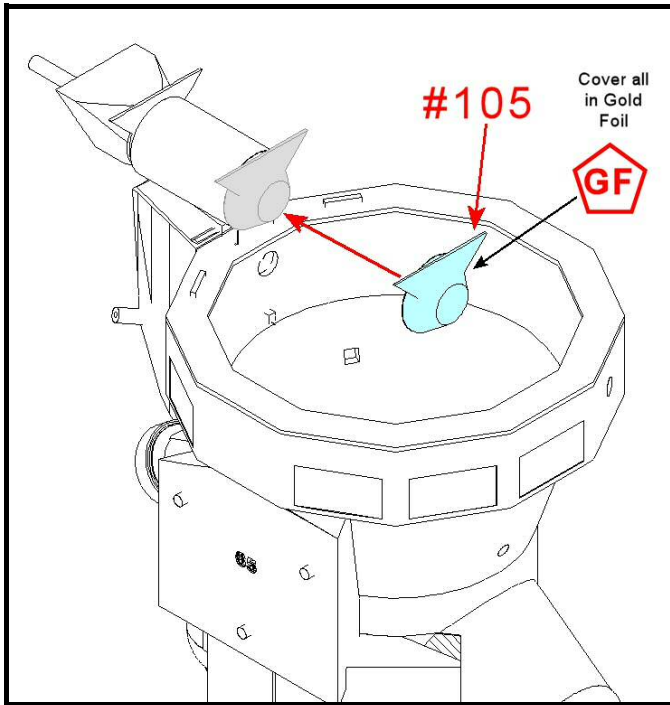


Figure 27

## STEP #26

This step starts the assembly of the fields and particles pallet. Find part numbers 58 and 59. Glue them together as shown in Figure 28.

Images of the spacecraft at the time of close out and installation of the spacecraft on the launch vehicle shown all parts of this pallet are clad in black thermal blankets.

## STEP #25

Find part number 105 and glue it to the rear of the magnetometer boom canister as shown in Figure 27. Make sure that the thin, triangular part of part number 105 aligns flush with the same part on the front of the boom canister. This is where the magnetometer canister shade will glue on in a later step.

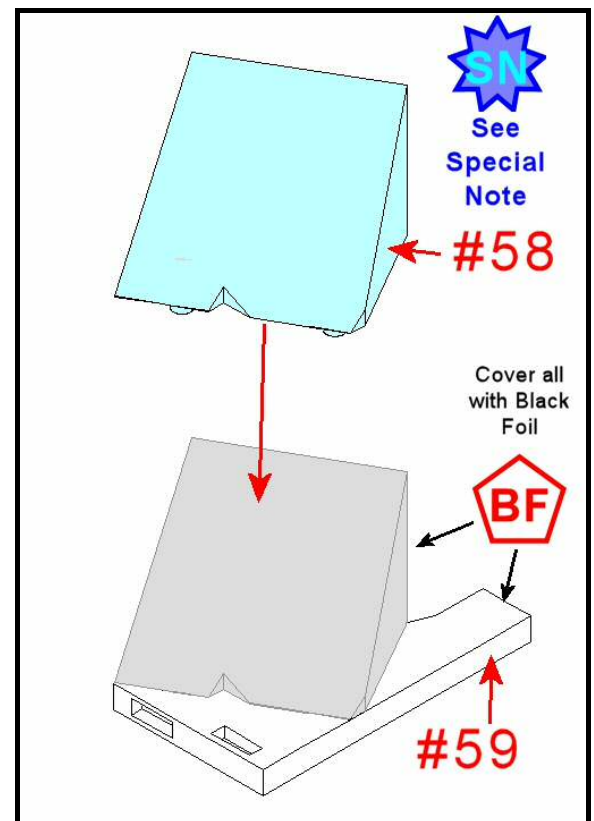


Figure 28

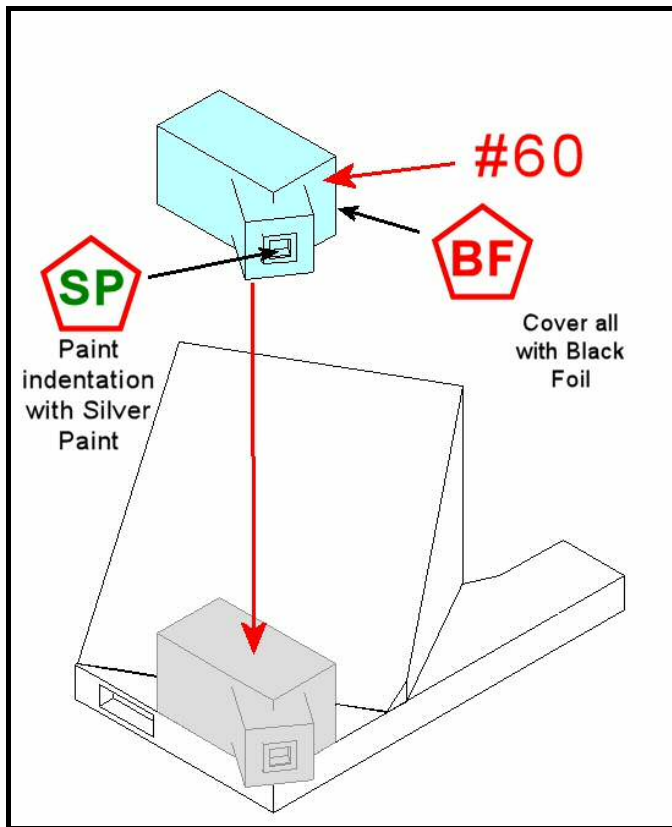


Figure 29

If you apply foil before assembly make sure you press the foil down well on the leading edge of part number 59. The indentations are needed in a later step.

## STEP #27

Find part number 60 and glue it to the pallet in the location as shown in Figure 29.

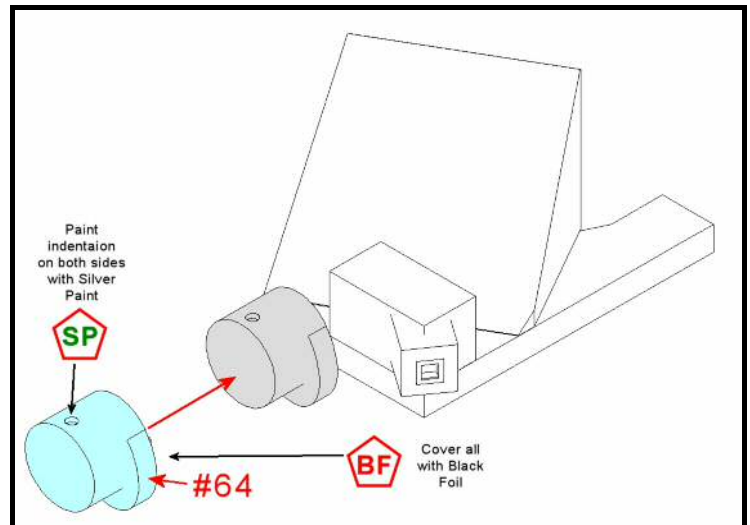


Figure 30

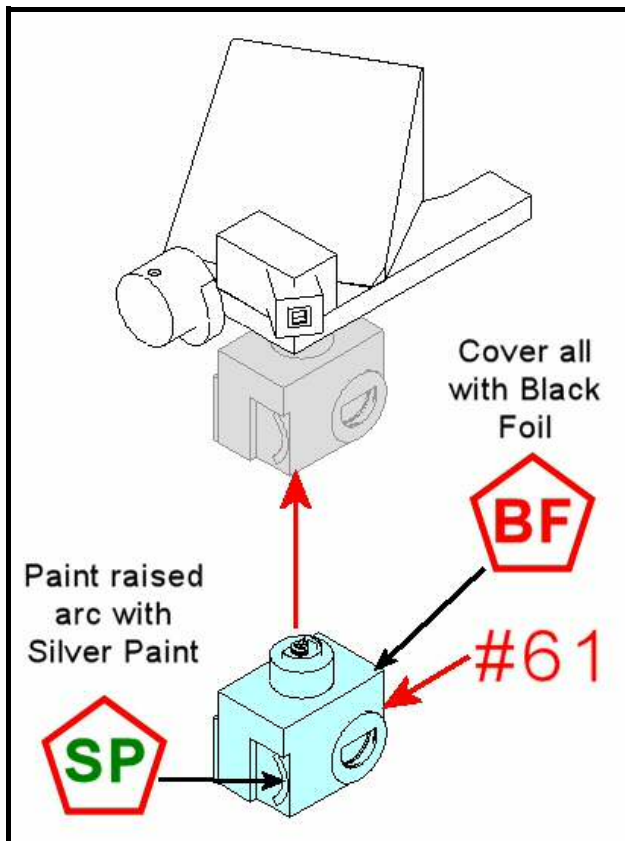


Figure 31

## STEP #28

Find part number 64 and glue it into position as shown in Figure 30.

## STEP #29

Find part number 61 and glue it into position as shown in Figure 31.

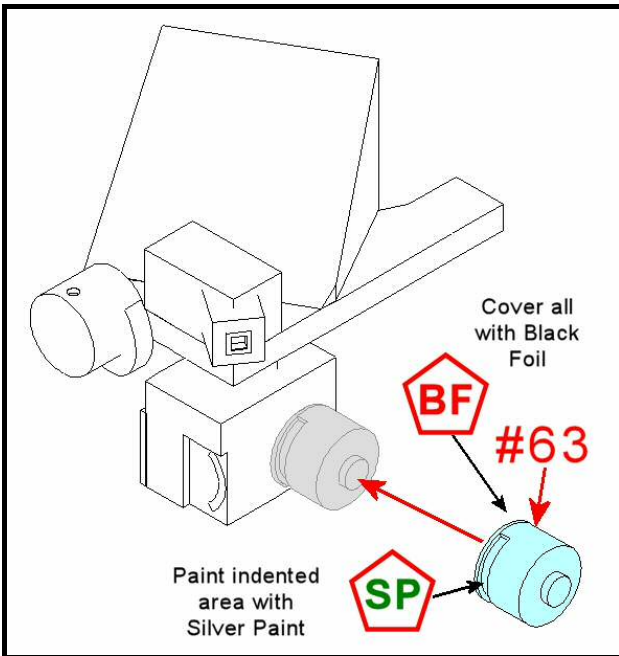


Figure 32

surface of the pallet as shown in Figure 33.

## STEP# 32

Find the two small thermal louvers part number 103 and glue them into the two slight indentations on the front face of the pallet, as shown in Figure 34.

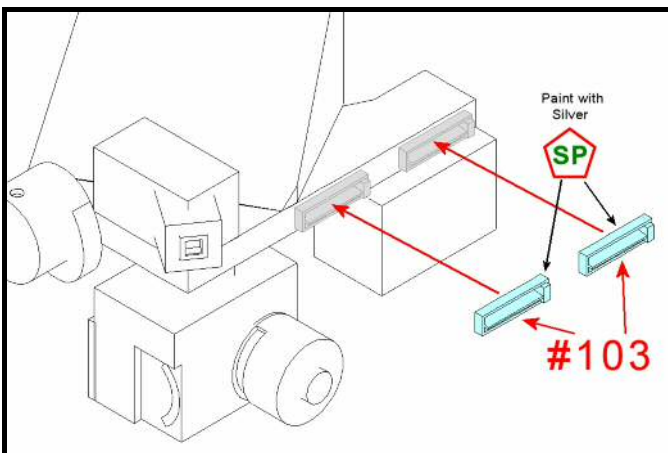


Figure 34

## STEP# 30

After finding part number 63, glue it onto the side of part number 61 from the previous step. This is shown in Figure 32.

## STEP# 31

In this step you will be glueing part number 62 in place on the bottom

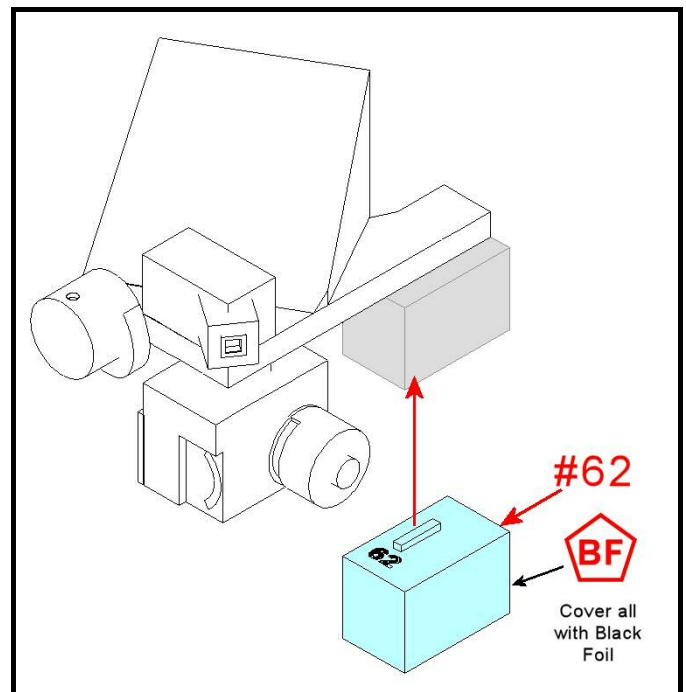


Figure 33

## STEP# 33

Find PE part 2p located on PE sheet 2 and glue it in place as shown in Figure 35. This should be done after foiling part number 60 from Step 27.

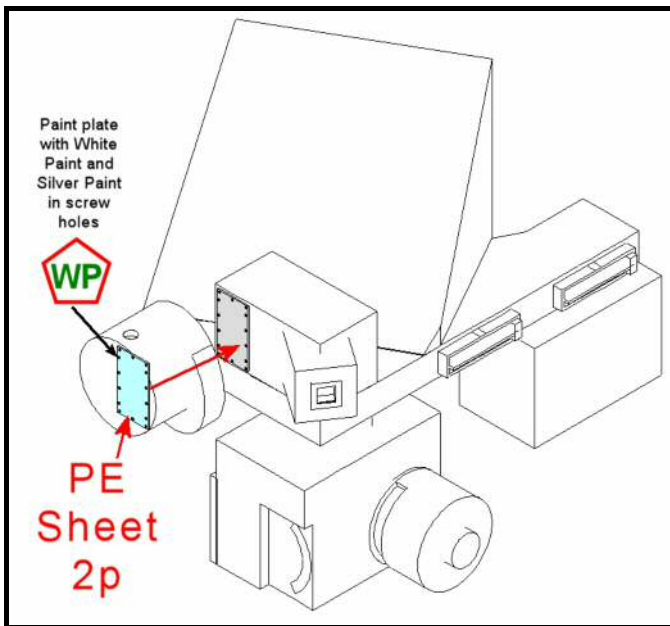


Figure 35

## STEP# 34

Find PE part 2"l" (this is a lower case L) on PE sheet 2 and glue it in place on the back side of part number 61 from Step 29. It is placed horizontally in the center of the part near the top of the part as shown in Figure 36.

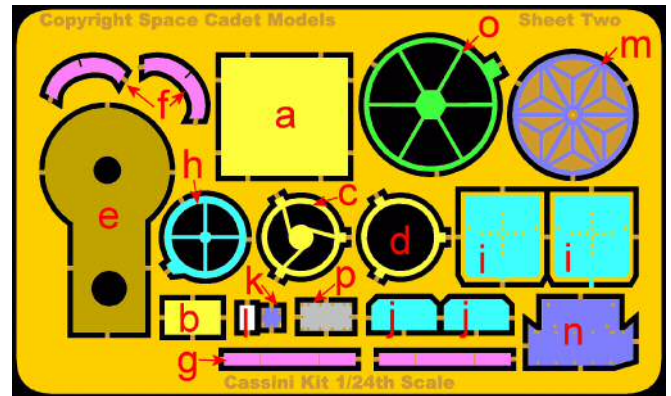
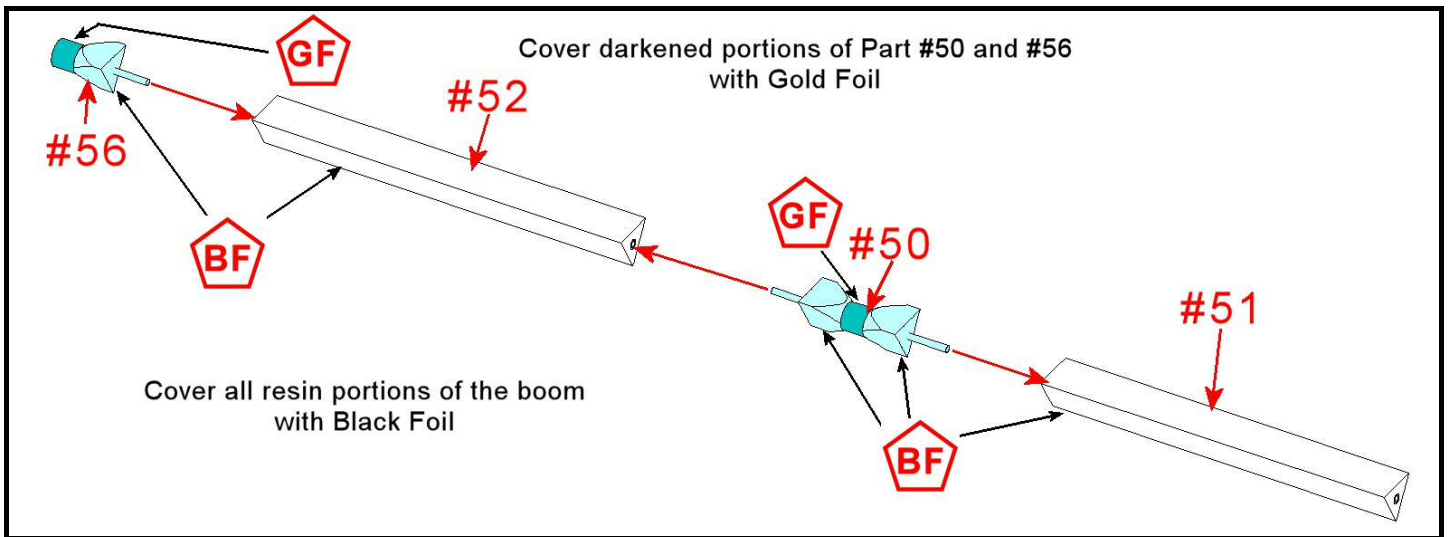


Figure 36

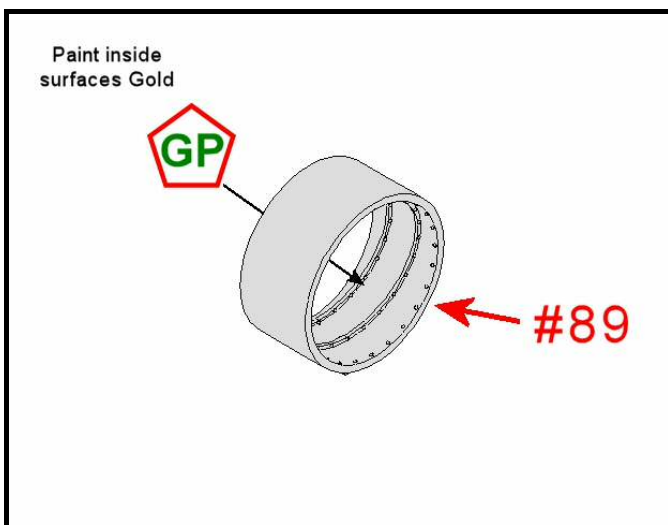
## STEP# 35

To assemble the magnetometer boom, find part numbers 50, 51, 52 and 56 (see Figure 37). Start by gluing part number 50 into part number 51, by sliding the rod from 50 into the hole in 51. Make sure the flat facets line up. Next glue the other side of part number 50 into part number 52. Also make sure the flat facets line up. The last part, number 56, glues into the other end of part 52.

Make sure that you have the correct parts, please note, part number 52 is longer than part number 51. It is strongly suggested that you attach this assembly till after the model is fully assembled.



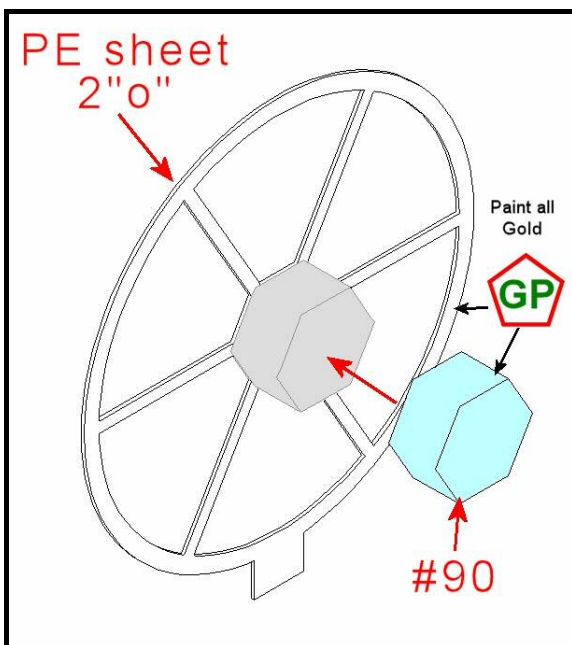
**Figure 37**



**Figure 38**

## **STEP# 36**

Find part 89 of the CDA. This part needs to be painted gold on the inside surface to be ready for a later step as shown in Figure 38.



**Figure 39**

## **STEP# 37**

Find PE part 2o (lower case "O") on PE sheet 2 and part 90. This is the secondary mirror and spider assembly of the CDA. Glue part number 90 to the center of PE part 2o as in Figure 39.

## STEP# 38

In this step you finish the CDA assembly. Find parts 87 and 86. Part 87 is the rear mirror. This is glued to the spider and front tube of the CDA that was from Steps 36 and 37. Start with part number 86, the mounting base and glue part 87 and the other two assemblies together in the order as shown in Figure 40. Make sure all the tabs of part 87, PE 20 and the front tube assembly line up. Glue the resulting tab into the slot on the base part number 86.

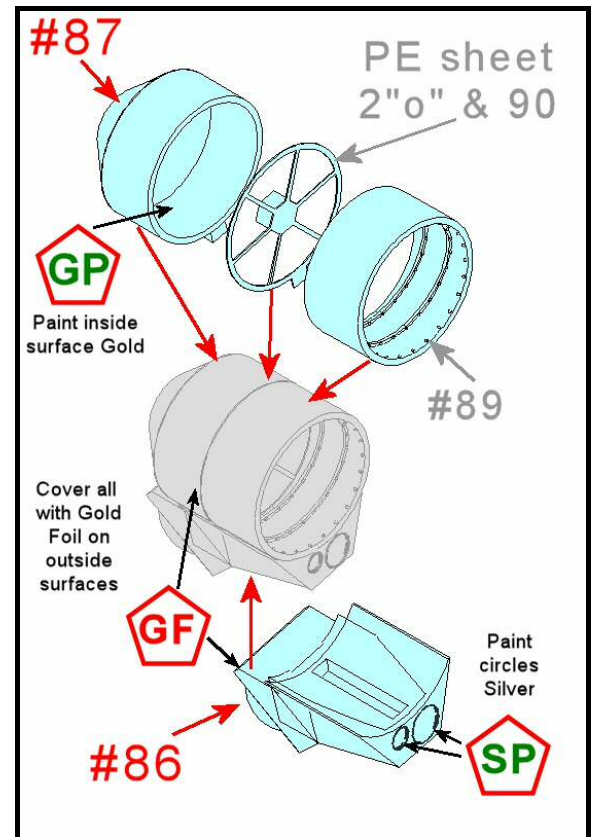


Figure 40

## STEP# 39

In Step 39, you start assembling the main instrument pallet. Find part number 67, the front panel. Also find part number 74 and glue onto the part number 67 inside the "C" marked in blue in Figure 41. This is the forward tube of the narrow angle camera. Make sure that the tab on part number 74 rests against the bottom part of the "C" ring as noted in Figure 41 by the blue arrows.

Please note alignment information. It is very important.

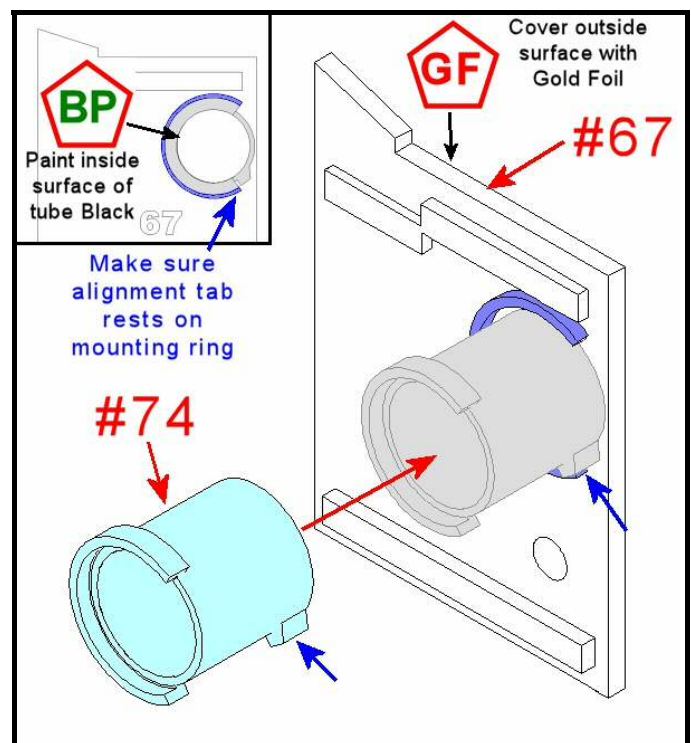


Figure 41

## STEP# 40

Please find PE part number 2h and glue into position as shown in Figure 42. Make sure the tab on PE part 2h rests on the "C" lip of part number 74.

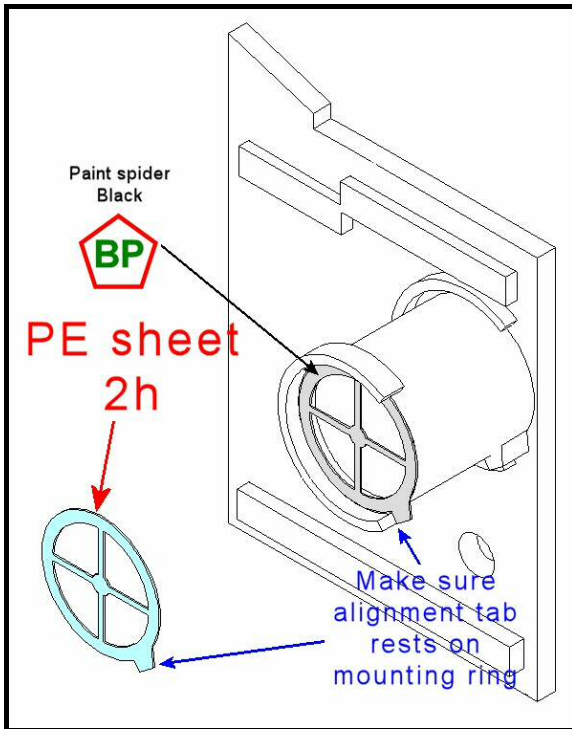
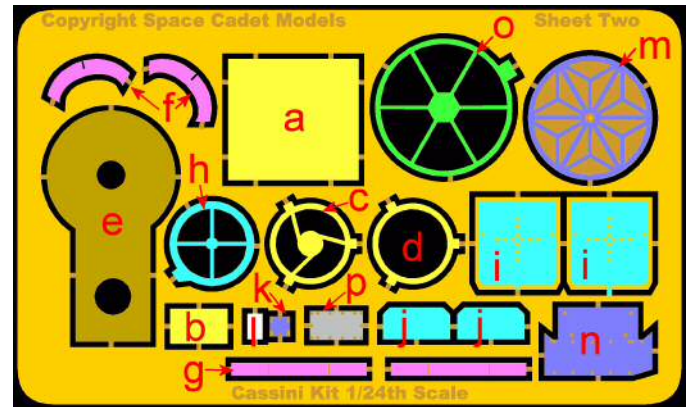


Figure 42



PE Sheet 2

## STEP# 41

Next find part number 73, rear tube of the Narrow angle camera.

Glue this to the assembly from the previous Step, as shown in Figure 43.

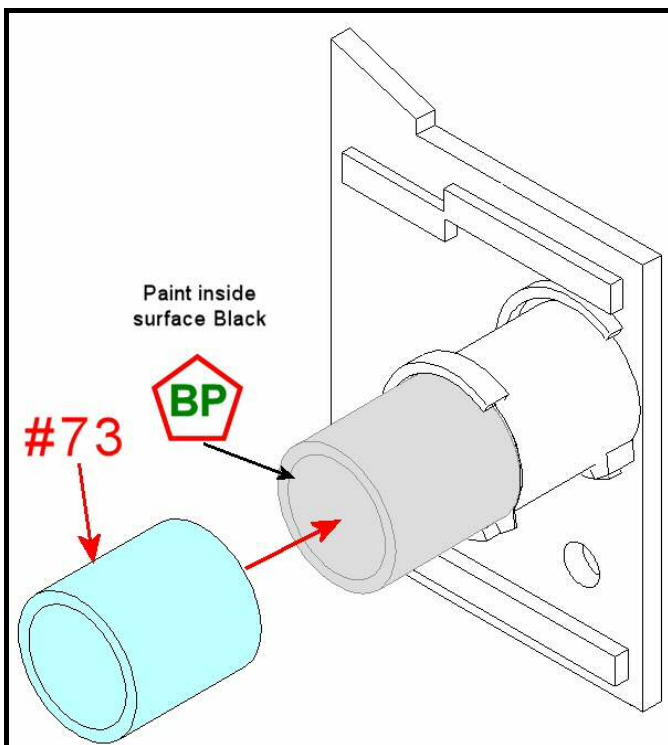


Figure 43

## STEP# 42

Next find part number 72, Narrow angle camera mirror and glue the part to the rear of the camera tube as show in Figure 44. Make sure that the flat edge of part number 72 is aligned perpendicular to the edge on the front panel. This is noted in figure 44 by the blue colored edges.

Please note that the alignment, as discussed in this step is very important if the side panel is to fit properly in a later step.

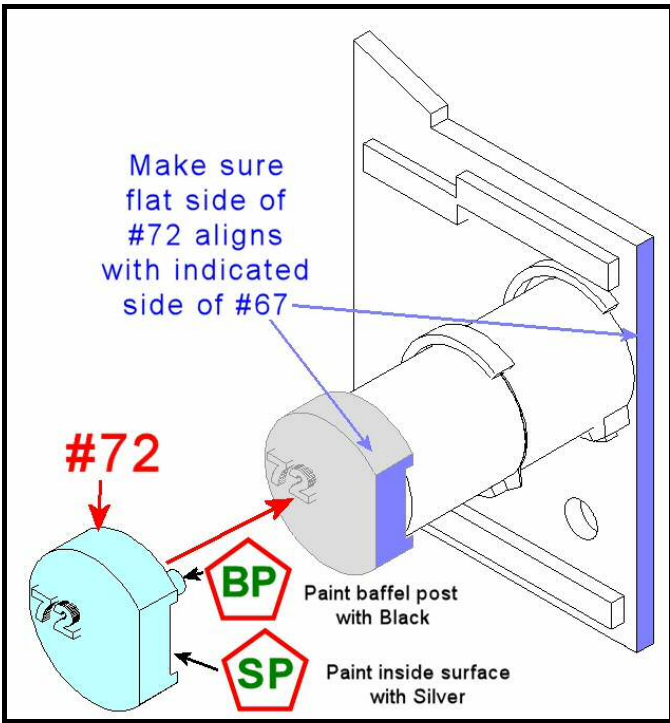


Figure 44

### STEP# 43

We have provided a 6mm white bead, to glue into the small hole on part number 67 to act as the wide angle camera lens. This is shown in Figure 45.

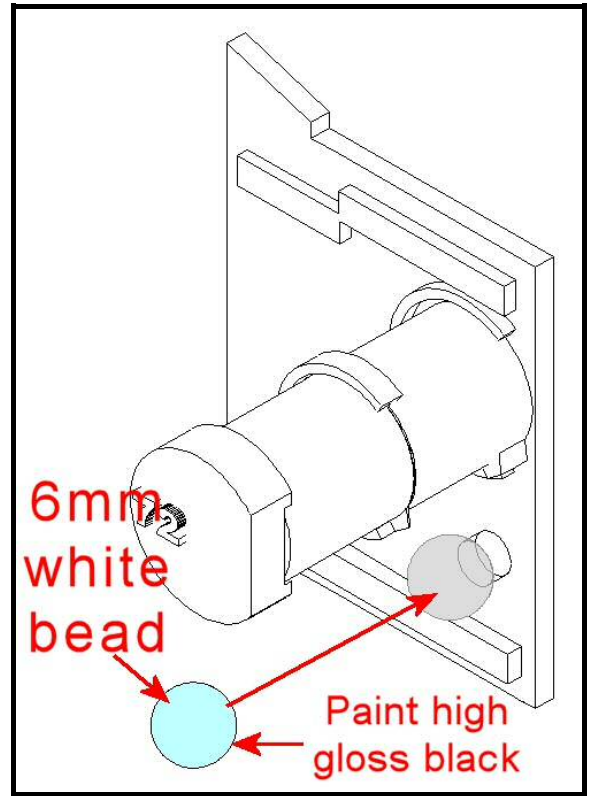


Figure 45

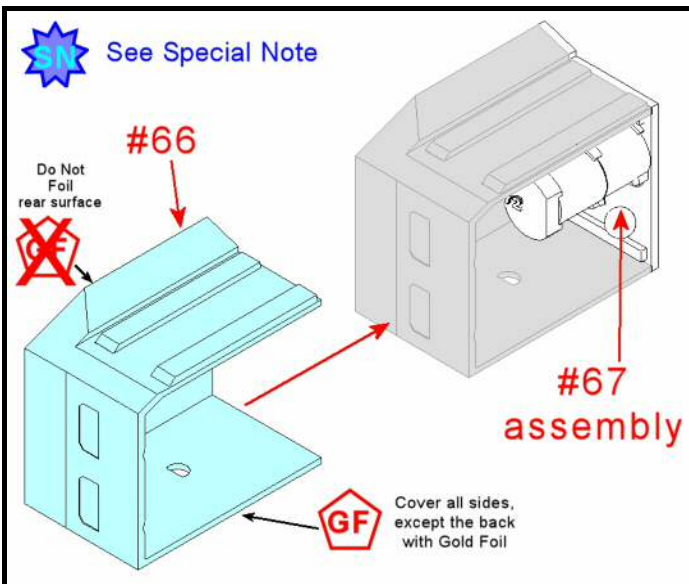


Figure 46

### STEP# 44

Find part number 66 and glue the font panel assembly to it as shown in Figure 46.

### STEP# 45

Find side panel number 68 and the two Stellar Reference Units, part number 109 and glue them

into the two holes in the side panel part number 68, as shown in Figure 47. Make sure that the ends of part number 109 with the large hole (see Figure 47 inset) is glued toward the outside. When properly assembled the front surface of both Part number

Optional: glue a small piece of tin foil, shiny side facing the small hole in the back side of part both number 109s, to simulate the lens of the Stellar Reference Units.

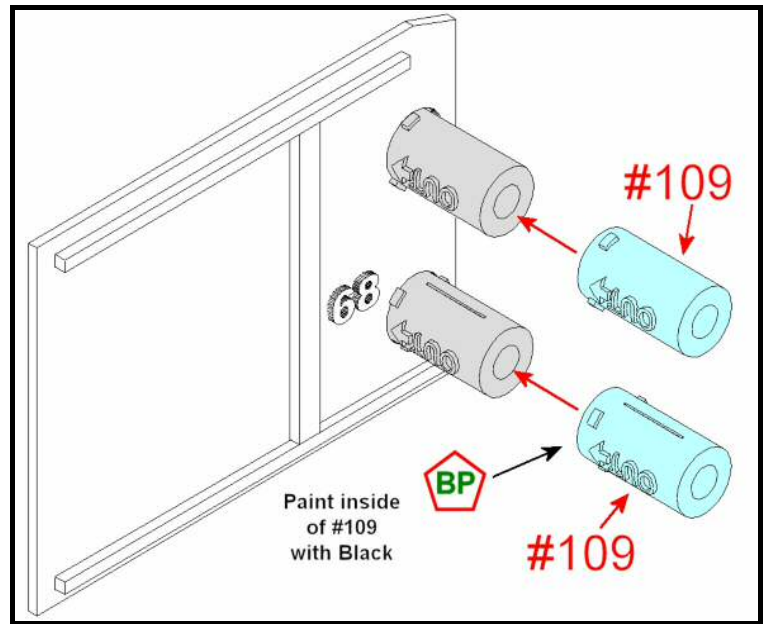


Figure 47

109s should be flush with the outer surface of side panel, part number 68.

## STEP# 46

Glue the side panel, part number 68, to the side of the Main instrument pallet's side as shown in figure 48.

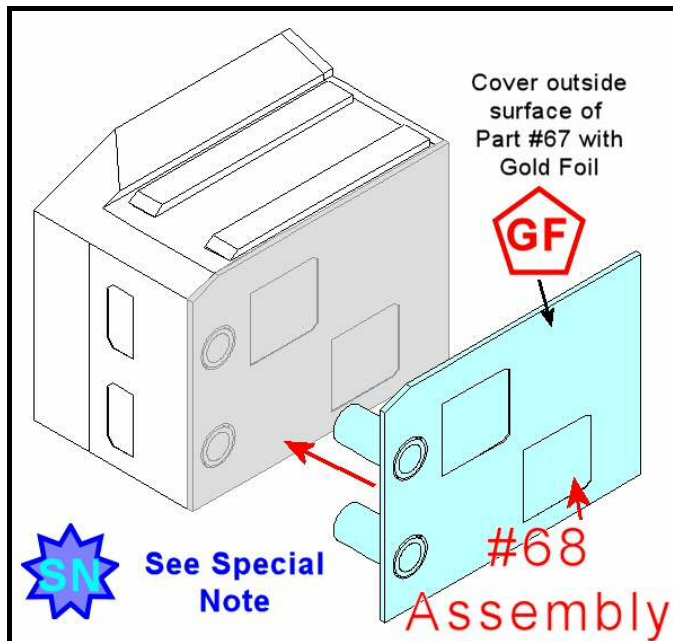


Figure 48

## STEP# 47

Find part number 69 and glue it to the top of the Main instrument pallet, as shown in Figure 49. This is the base to the VIMS Infrared Channel instrument and the housing for the VIMS Visible Channel instrument.

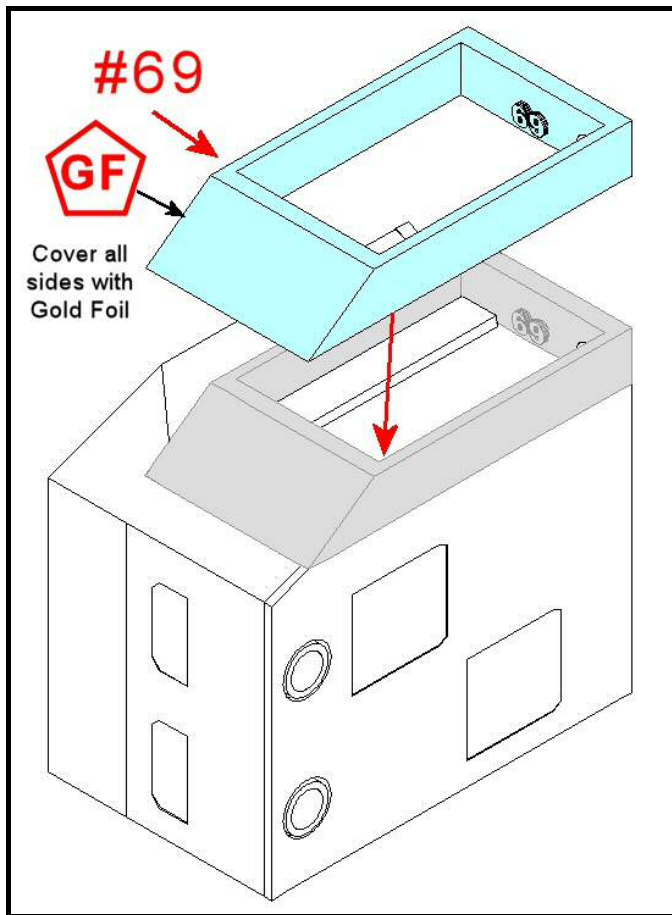


Figure 49

## STEP# 48

Next, glue part number 70, the VIMS light shield, to the top of part number 69, as shown in figure 50.

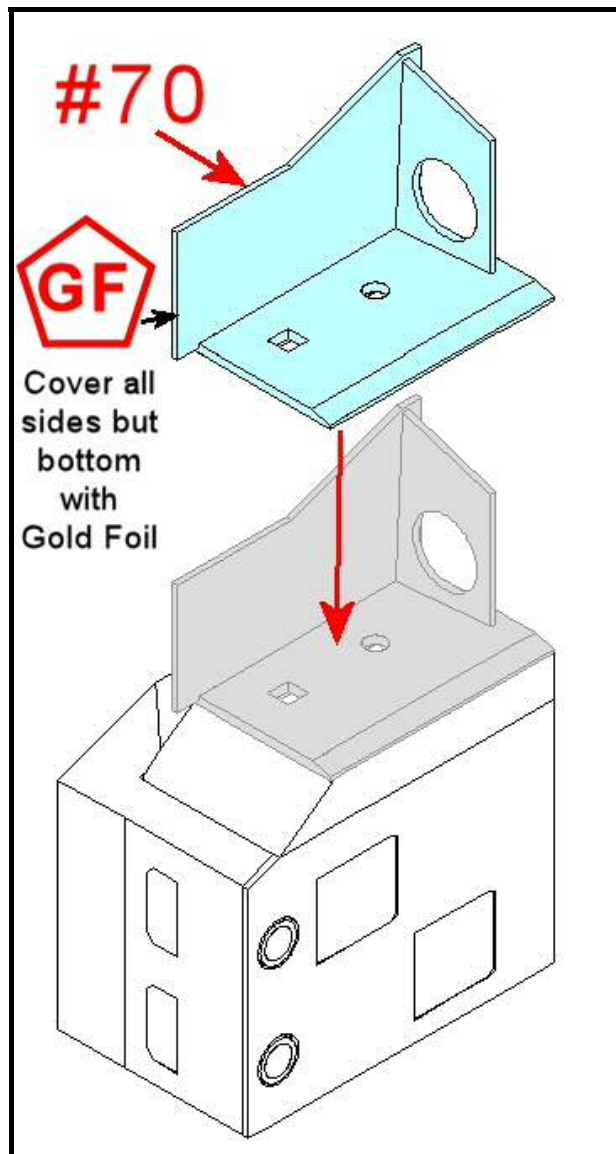


Figure 50

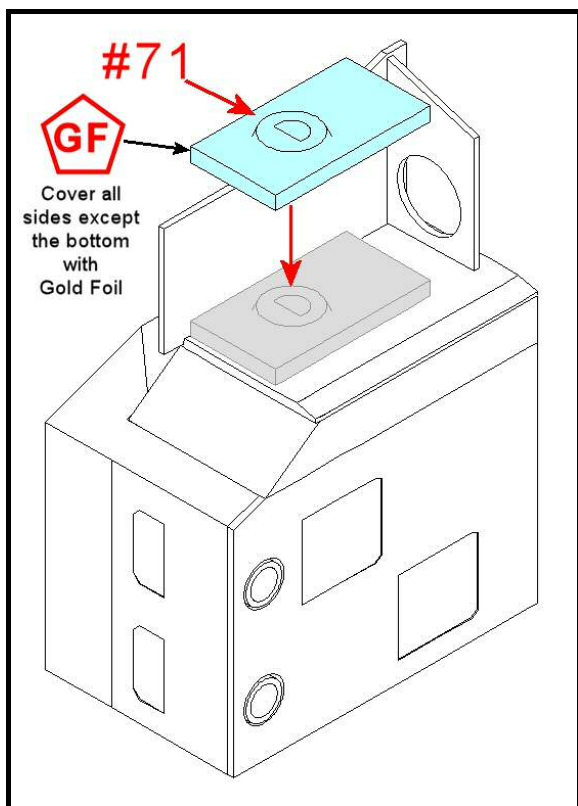


Figure 51

## STEP# 49

Find part number 71 and glue it to the top of part number 70, as shown in Figure 51.

## STEP# 50

This step starts the assembly of the VIMS Infrared Channel instrument. Find part numbers 81 and 82 and glue part number 82 to the rear of part number 81, as shown in Figure 52.

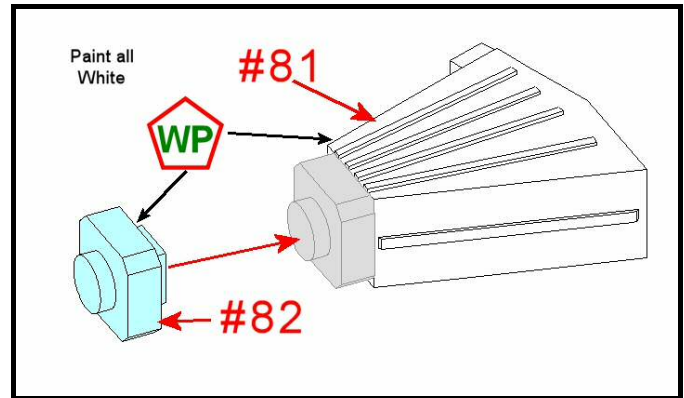


Figure 52

## STEP# 51

Find part number 83, the mirror, and glue it to the front, right of part number 81, as in Figure 53.

## STEP# 52

Find part number 84, the VIMS telescope tube, and glue it to the mirror assembly, part number 83.

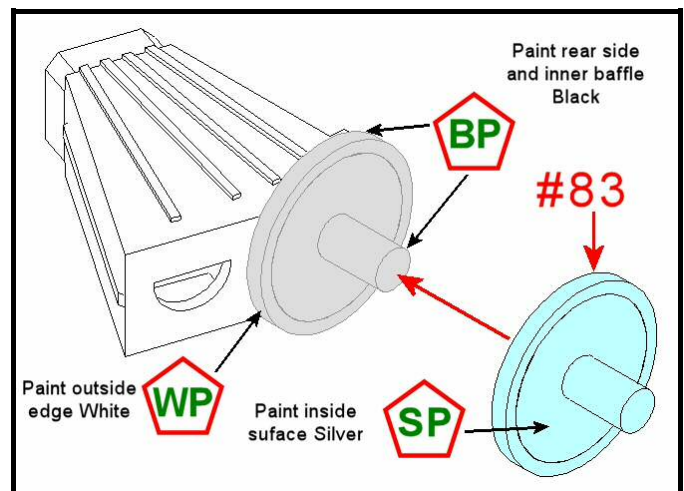


Figure 53

### Please Note

Make sure that the tube is rotated as shown in Figure 54's insert. The bottom edge of the protruding box should be at the ~90 degree position when it is aligned

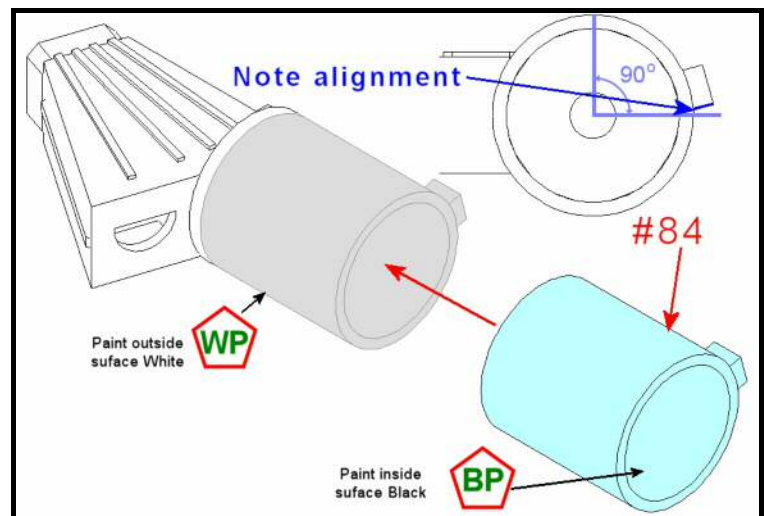


Figure 54

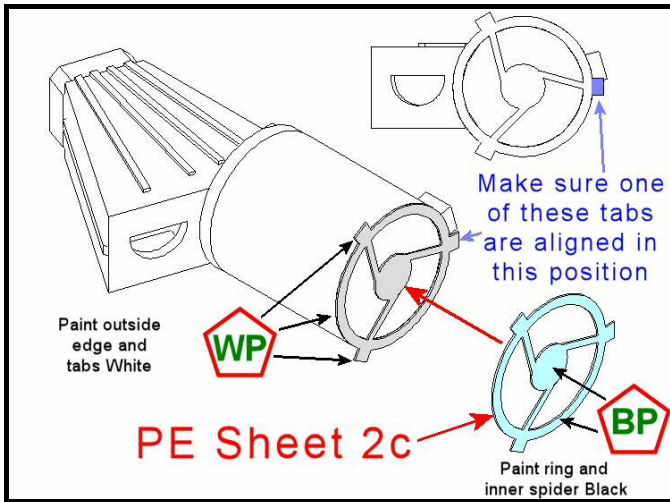


Figure 55

## STEP# 53

Find PE part number 2c on PE sheet 2 and glue it to the front of tube number 84 as shown in Figure 55.

### Please Note

Make sure that one of the tabs on PE part 2c aligns at the 90 degree position as shown in Figure 55's insert.

## STEP# 54

Find part number 93, the VIMS radiator, and glue it to the body of the VIMS instrument, as shown in Figure 56. If there is any play in the part number 93, when it attaches, make sure that the square opening is 90 degrees vertical to the plane of the instrument box.

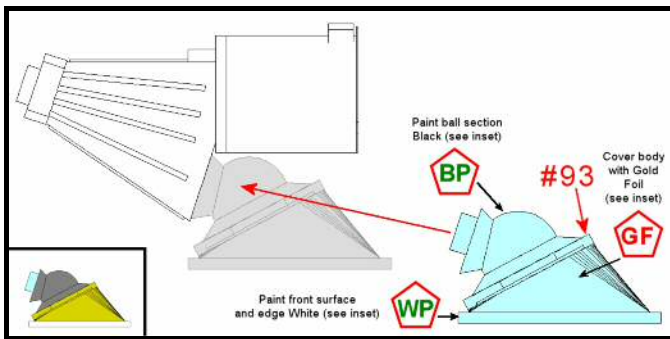


Figure 56

## STEP# 55

In this Step, you will need to find part number 96 and glue it into place, as shown in Figure 57. The straight end should be placed at the center of the box attached to the front of the VIMS telescope tube. The curved end of the wiring conduit needs to be rotated until it mounts flat on the box on

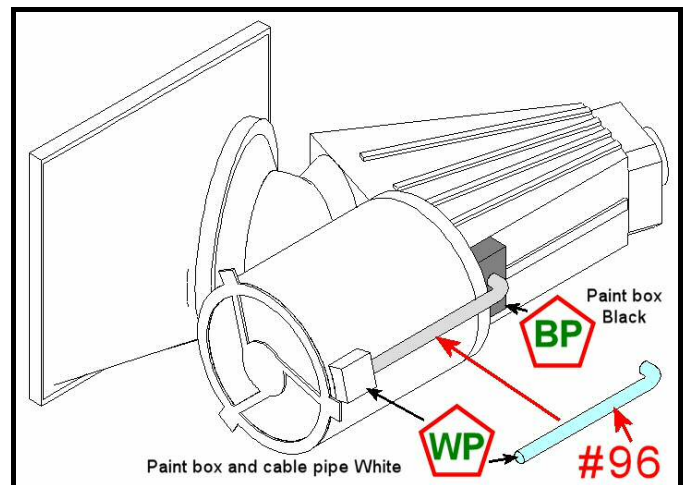


Figure 57

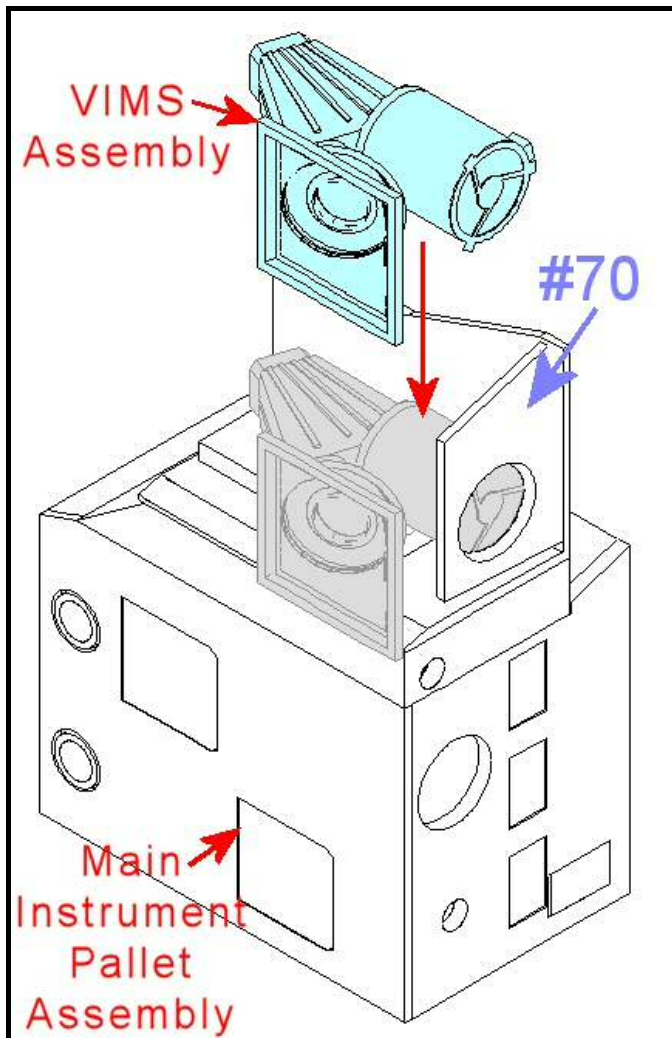


Figure 58

flush with the telescope hole in the light shield. Also, make sure that the PE part 2d is rotated so that one tab of the part is at the 90 degree from the top as shown in the Figure 59 insert. The VIMS instrument is one of the few parts of the spacecraft that is not entirely covered in thermal blankets. See the painting instructions for information on how to paint it.

the side of the VIMS instrument housing.

## **STEP# 56**

Glue the VIMS assembly into place as shown in Figure 58. The front of the telescope tube should fit flush against the VIMS light shield, part 70. If it is a little short of this position or a little tight, you might need to shave the mounting tab on the bottom of the VIMS assembly to adjust to make flush.

## **STEP# 57**

Find PE part 2d (see PE Sheet 2) to the outer surface of the VIMS light shield. Position it so that the inner edge of the ring PE 2d is

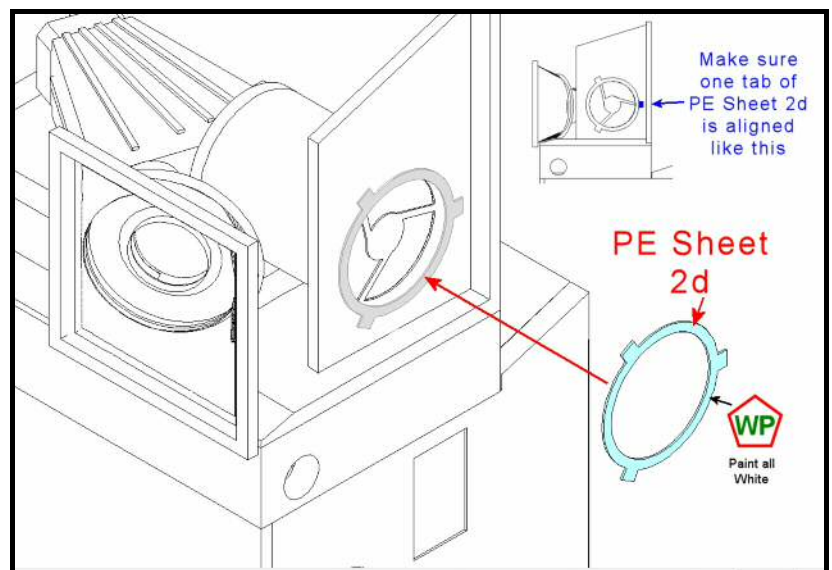
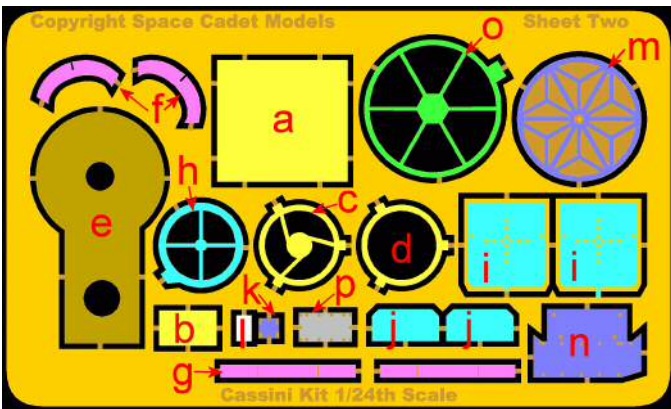


Figure 59

## STEP# 58

Find part number 85, VIMS telescope outer ring and glue in the position shown in Figure 60. It should be centered on PE part 2d.



PE Sheet 2

## STEP# 59

Find PE parts 2j on PE Sheet 2 and glue them into position as shown in Figure 61. The side with both corners cut off should be positioned to the spacecraft mounting side of the pallet. This would be toward the left as you are looking at the rear of the Main instrument pallet.

## STEP# 60

Find PE part number 2i on PE Sheet 2 and glue them into

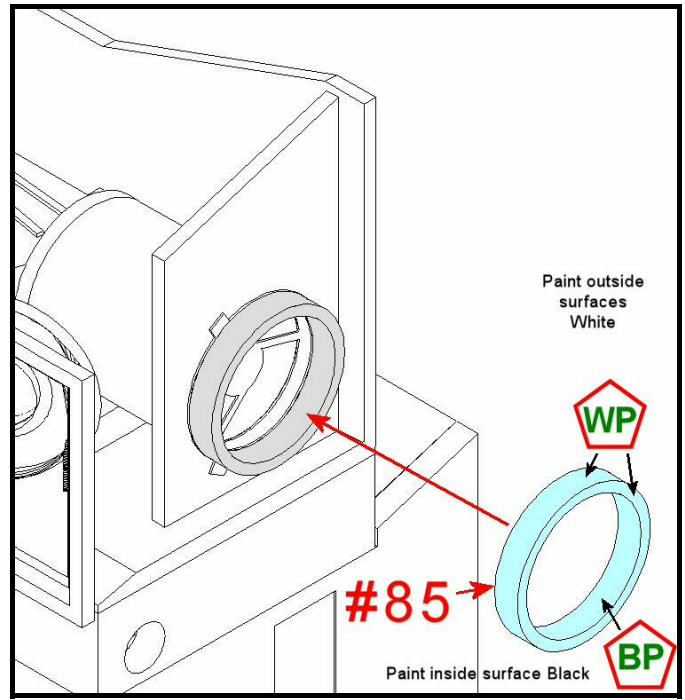


Figure 60

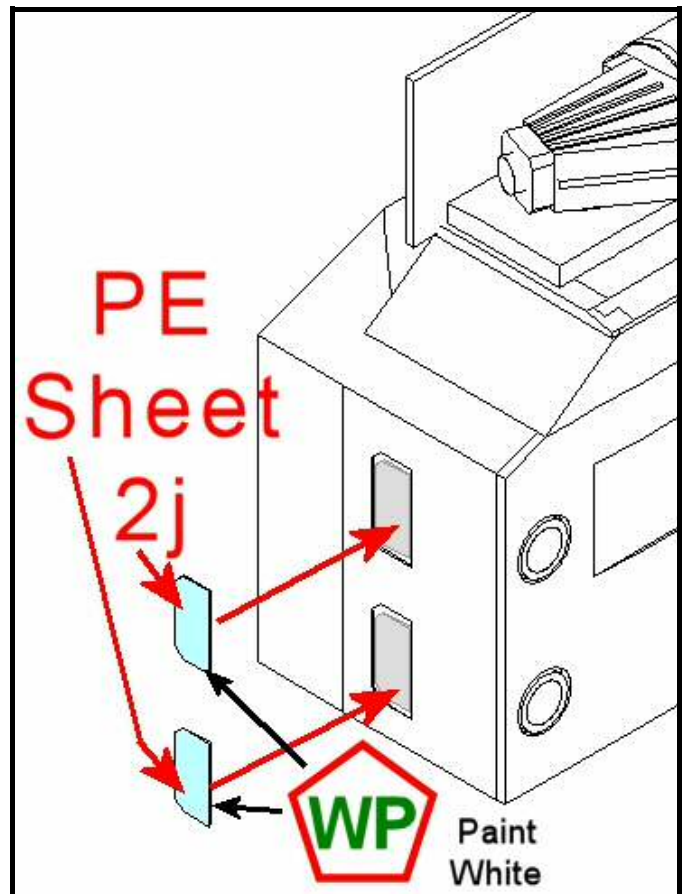


Figure 61

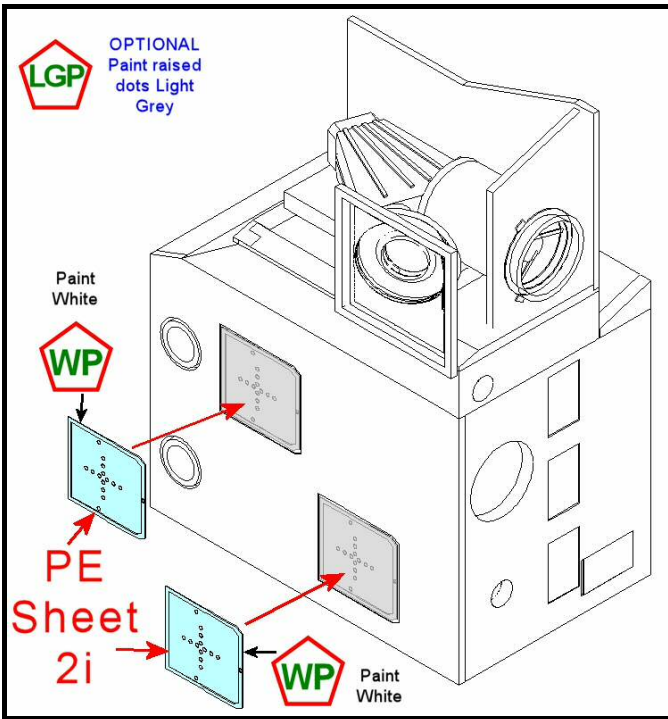


Figure 62

directly below PE part 2a with only a small gap between the two PE parts. Center PE part 2b horizontally to PE part 2a. See Figure 63.

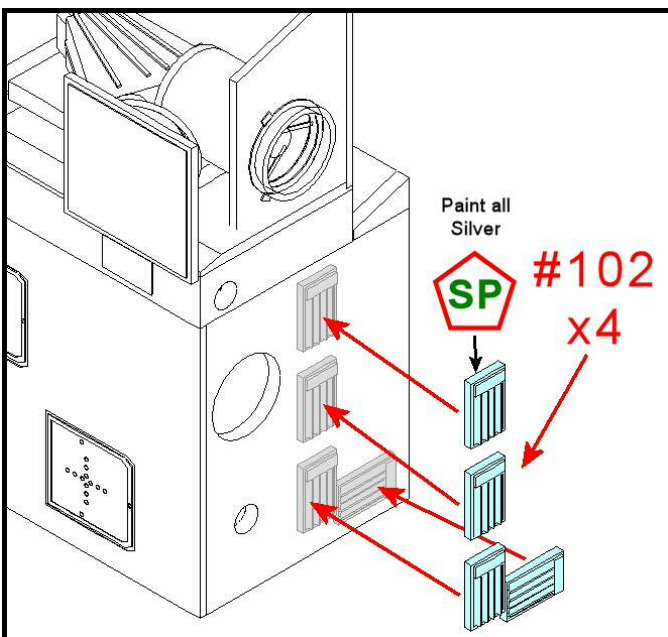


Figure 64

position, as shown in Figure 62. Position the side of PE part 2i that has the corners cut off to the right facing the front of the Main instrument pallet.

## STEP# 61

Find PE parts 2a and 2b on PE sheet 2. Cover one side of PE part 2a (the large square) with gold foil. Try to keep it as smooth and wrinkle free as possible. Glue PE part 2a, centered on the VIMS radiator cone. Glue PE part 2b

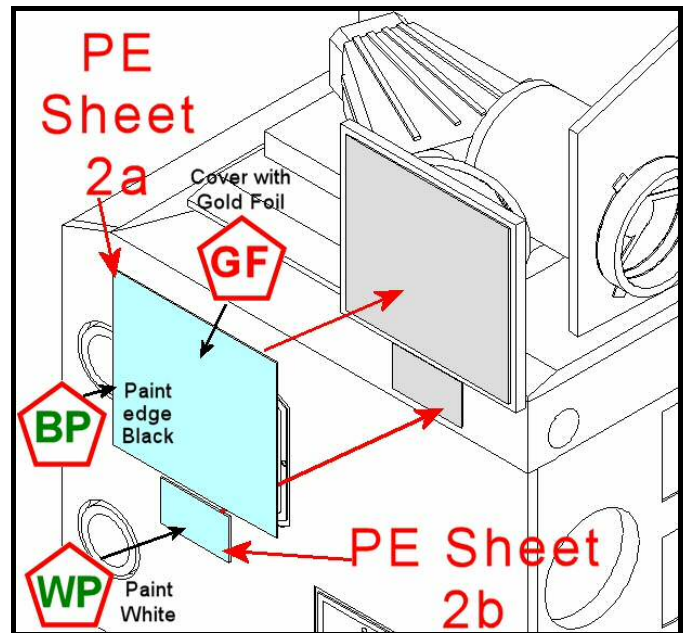


Figure 63

## STEP# 62

Find the four medium size thermal louvers part number 102 and glue them in place on the Main

instrument pallet, as shown in Figure 64. Position the three vertical mounted louvers with the mechanism drive section to the top and the louvers angled to the right. Position the lower, fourth unit with the mechanism drive section to the right and the louver angled down.

## STEP# 63

This Step starts the assembly of the CIRS instrument. Find part numbers 75 and 79 and glue them together as shown in Figure 65.

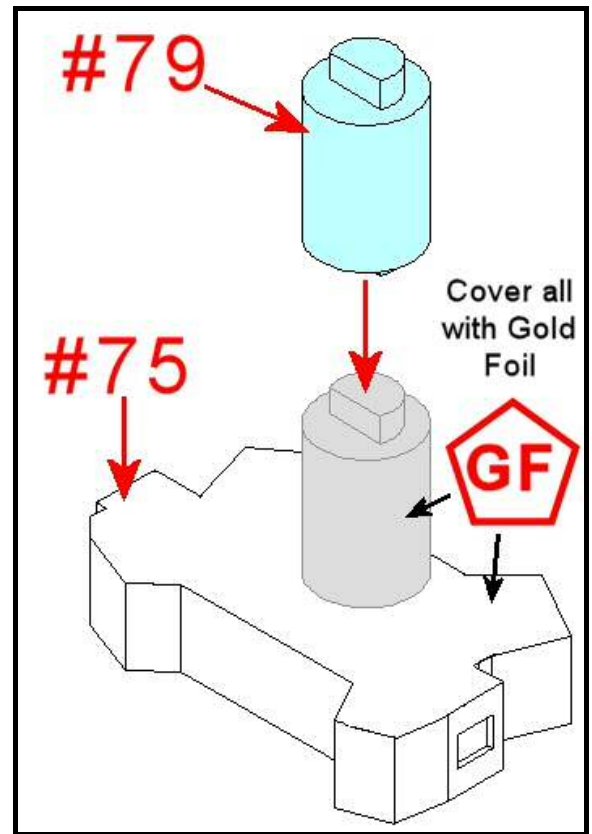


Figure 65

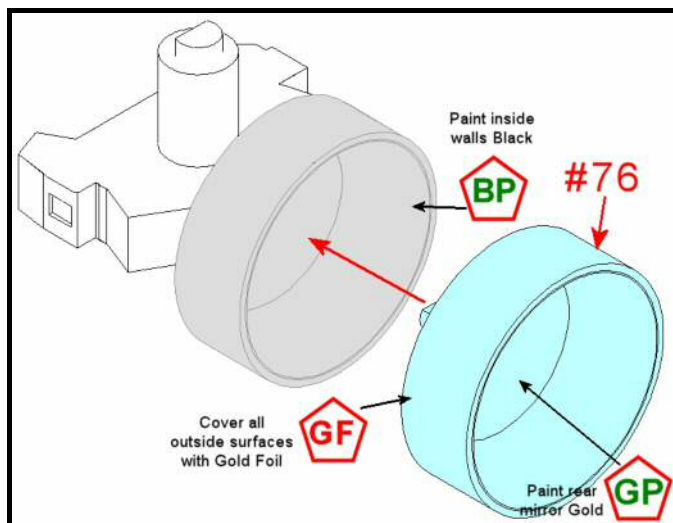


Figure 66

## STE P# 64

Find part number 76, the CIRS mirror assembly and glue it into

place, as shown in Figure 66.

## STEP# 65

Find part number 77, the CIRS secondary mirror mount and glue it in position as shown in Figure 67.

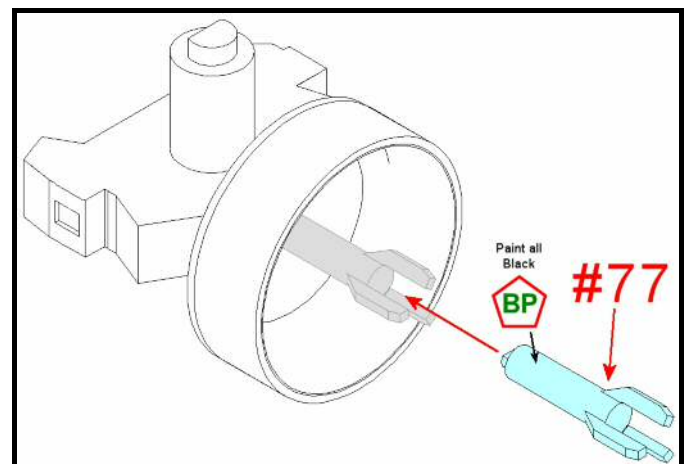


Figure 67

## STEP# 66

Find the CIRS secondary mirror, part number 78 and glue it to the end of the mount as shown in Figure 68.

## STEP# 67

Find part number 80, the CIRS radiator, and glue it into place, as shown in Figure 69.

## STEP# 68

Locate PE part number 2m and glue it to part number 80. Position it as shown in Figure 70's insert.

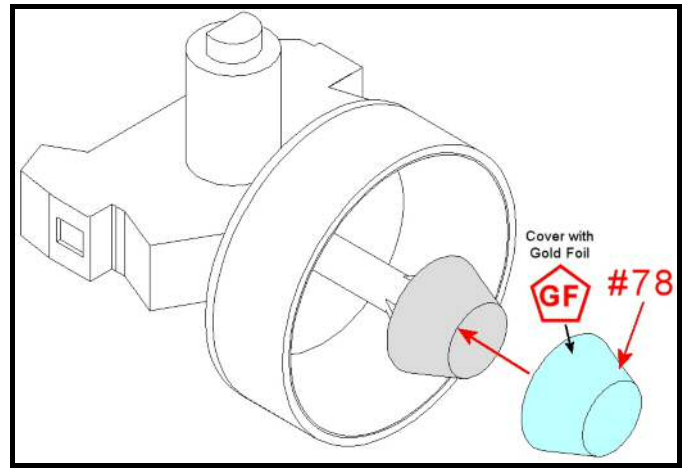


Figure 68

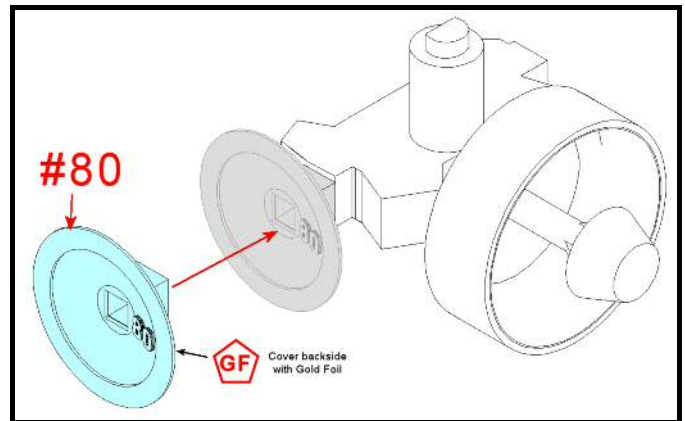


Figure 69

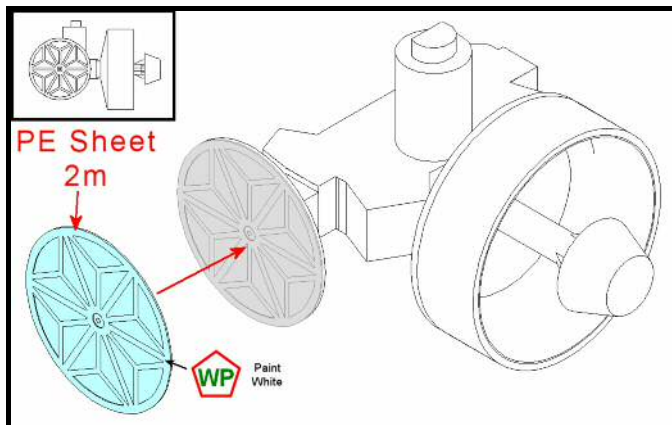


Figure 70

insert and glue to the bottom of the CIRS housing. Center the PE part on the housing horizontally, as shown in Figure 71.

## STEP# 69

Find PE part 2n on PE sheet 2, fold part as shown in Figure 71's

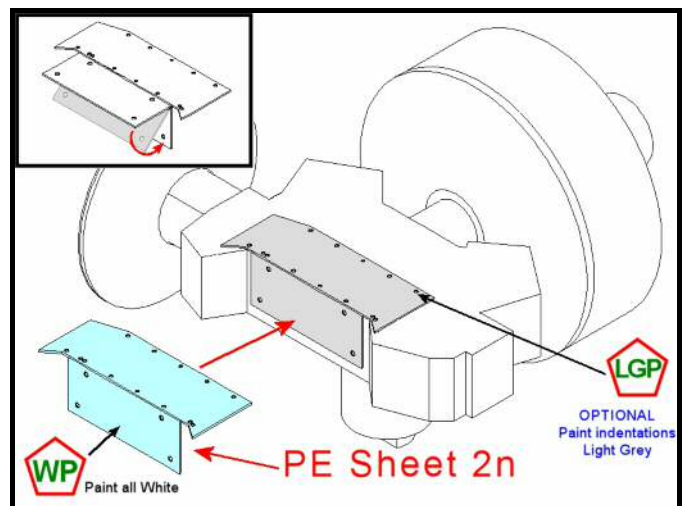


Figure 71

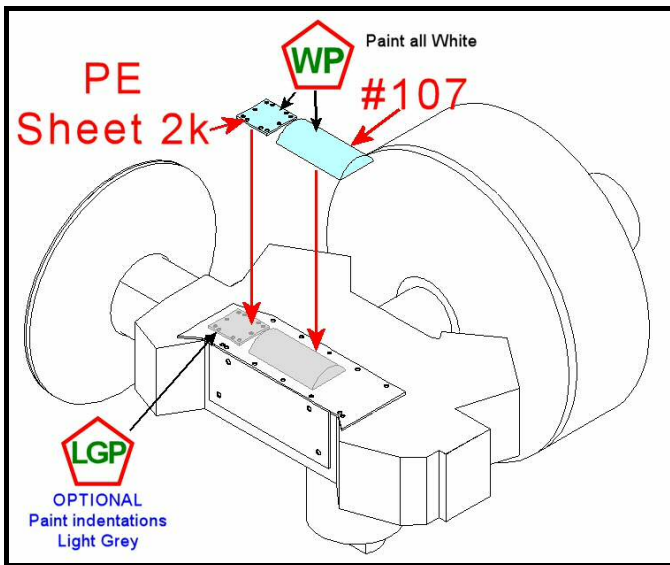


Figure 72

and the edge of PE part number 2n.

## STEP# 71

This starts the assembly of the MIMI INCA sensor. Find all twenty collimator fins on PE Sheet 3. They are parts 3b. Next find Tool 1. This tool is used to hold the twenty fins at the correct angle until they are glued into the base.

**DO NOT GLUE, the twenty fins, into Tool 1**, as it will be removed in a later step. Slide the PE fins into the slots of Tool 1 as shown in Figure 73. The tool should hold onto the fins well enough to allow you to pick up the combined Tool and PE fins to allow the installation into the instruments base. [SEE Special Notes on Page 10.](#)

## STEP# 70

Find part number 107 and PE part number 2k from PE Sheet 2. Glue them into place as shown in Figure 72. Glue part 107 first, as it needs to be centered on PE part 2n. Center it both front to back and left to right. PE part 2k is then glued, to the left of 107, centered front to back and centered in the area to the left of part number 107

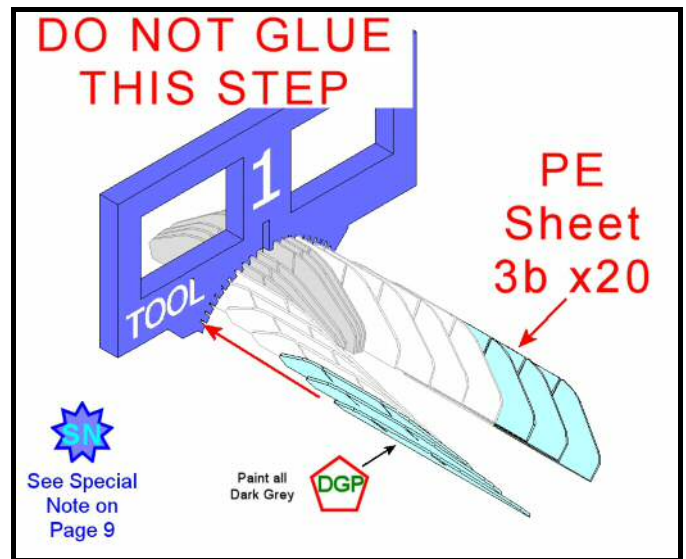
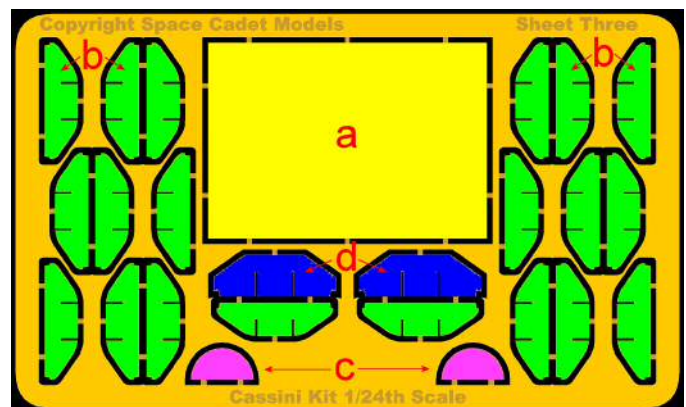


Figure 73

Slide the PE fins



PE Sheet 3

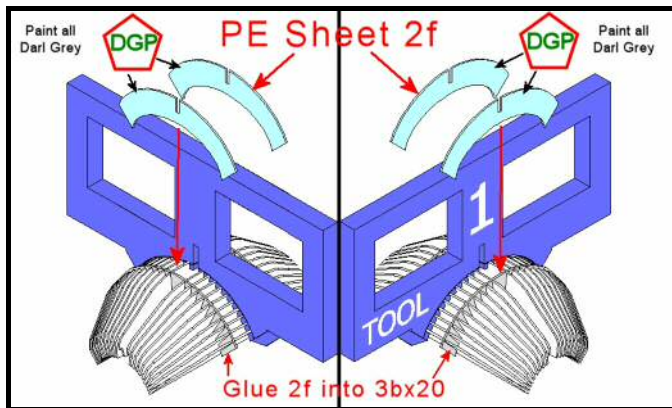


Figure 74

pins.

## STEP# 73

Find Part number 92 and lower the assembly from Step 72 into the top, angled holder as in Figure 75. The Tool 1 should rest on the edges of Part 92. The small notches in the front and rear ends of the twenty fins should rest on the semi-circular ends of the base. Glue the fins into the base, being careful not to get glue into the large gap between the inner two center fins. This area will have a final fin added and glue residue might cause this last fin to not sit down properly. Once the fins are glued into the base, you can remove Tool 1.

## STEP# 72

Find PE part numbers 2f on PE Sheet 2. Glue these curved parts into the slots in the twenty fins as shown in Figure 74. Make sure the slots in the top surface of each curved PE part 2f is centered in the large gap between the central

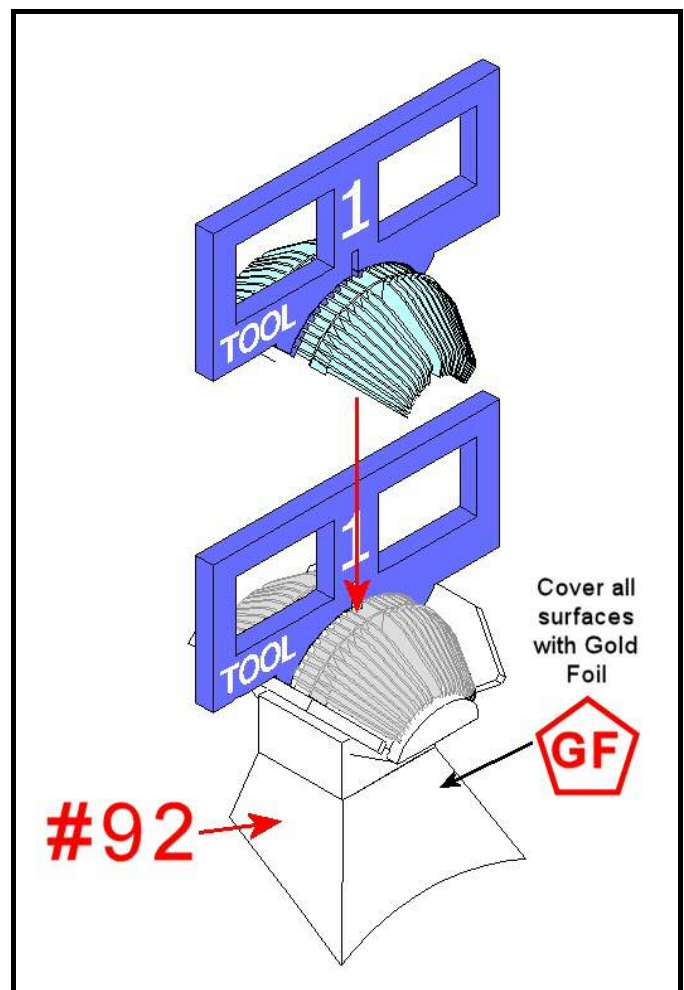


Figure 75

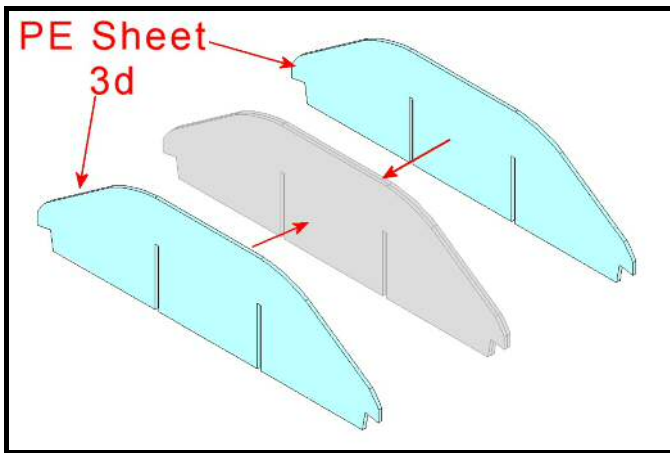


Figure 76

## STEP# 74

Find both PE part number 3d on PE Sheet 3 and glue them together. Make sure the slots line up and that no glue gets into the gaps.

## STEP# 75

Slide the dual PE parts 3d into the large gap between the inner two fins. Make sure the slots in 3d slide into the slots in PE part 2f. Glue in place as shown in Figure 77.

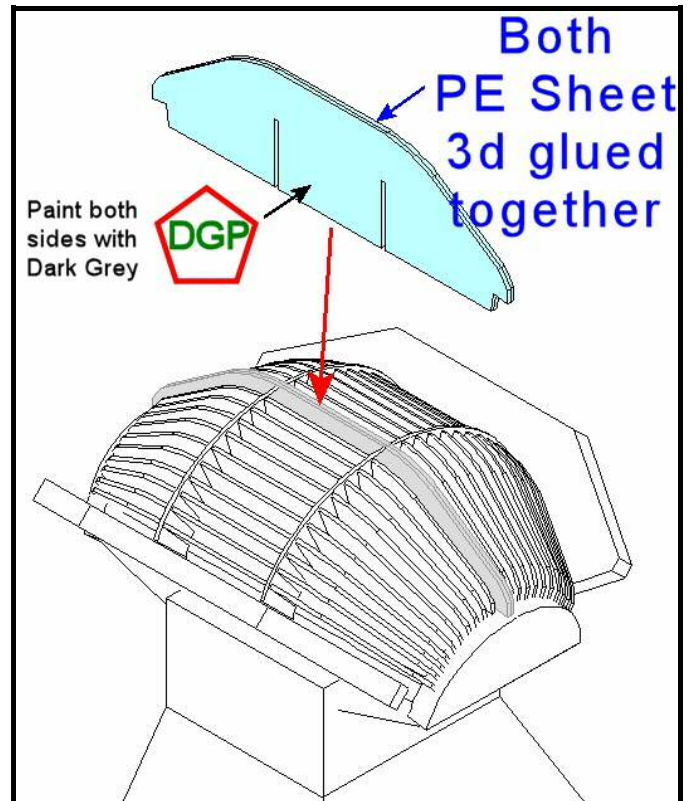


Figure 77

## STEP# 76

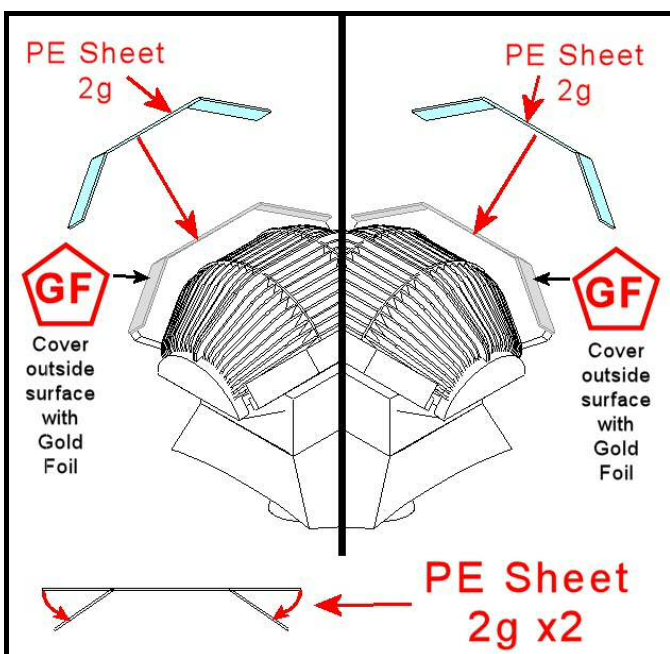


Figure 78

Find both PE parts 2g on PE Sheet 2 and bend them as shown in Figure 78. They glue to the top edges of the sides on Part number 92. These PE parts are wider than the edge, make sure that the overhang faces the center of the instrument.

Option: To make the MIMI INCA model look more like the one on the Cassini Spacecraft, acquire a small square of light grey or silver nylon stocking material. Before glueing the PE parts 2g to the instrument, lightly stretch the nylon over the face of the instrument. Only stretch it enough to remove wrinkles. Once the nylon is glued in place, glue PE parts 2g into place as noted in Figure 78. Trim the nylon to remove excess stocking material.

**STEP# 77**

In this step, we complete the Main instrument pallet. Find the CIRS assembly, completed in Step 70. Glue it to the bottom of the Main Instrument pallet box, as shown in Figure 79.

**STEP# 78**

Perform this Step three times. Find part numbers 31 and 32. There are three of these in each kit. Glue part number 32 to part

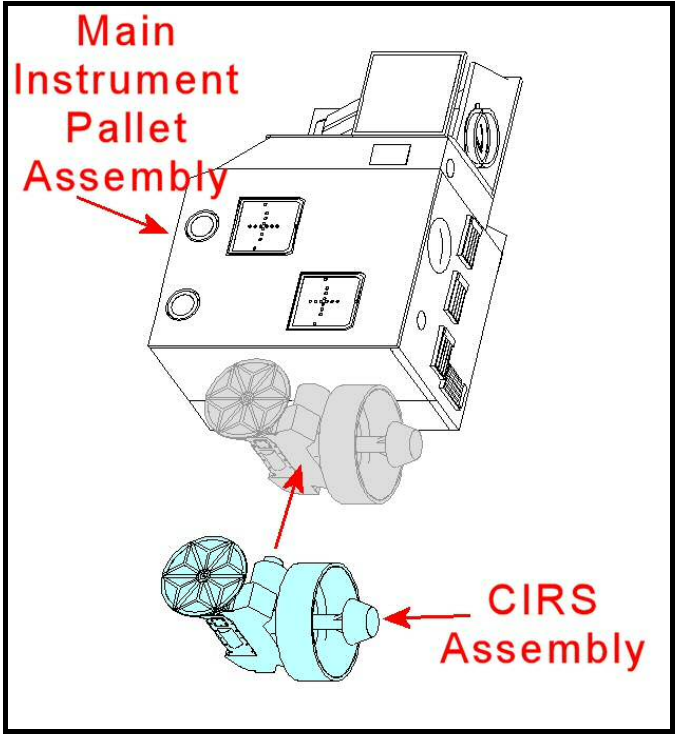


Figure 79

number 31, as shown in Figure 80. Make sure it slides as far forward as possible. Make sure that no glue seeps into the grooves, running the length of part number 31. This would hinder the installation of the RTGs fins.

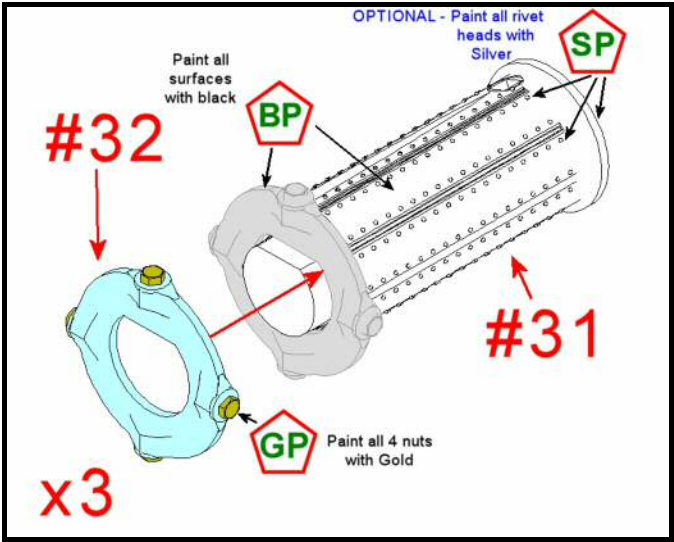


Figure 80

**STEP# 79**

Perform this Step three times.

Find part number 30 and glue it to the assemblies that were made in Step 78, as shown in Figure 81. Also make sure that no glue seeps into the slots that run the length of part number 30.

## STEP# 80

**We modified this part..**

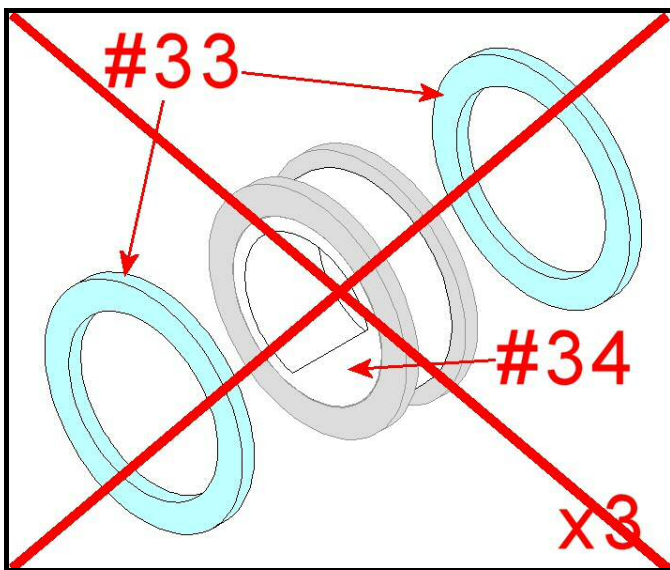


Figure 82

assembly made in Step 79. This includes part numbers 30, 31, 32, 33 and 34.

## STEP# 82

**Perform this step three times.** In this step you add all 16 RTG radiator fins to the body of the RTGs. Find Tool# 2 and PE parts 1a and 1b. You will need eight PE

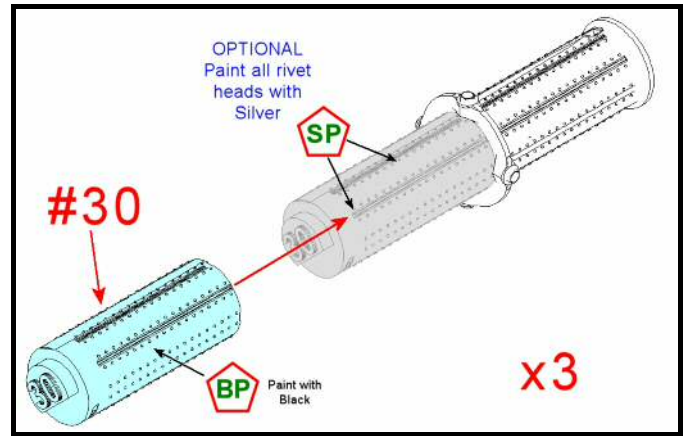


Figure 81

We modified part numbers 33 and 34 so you do not need to do this STEP. There should be a total of three part #34s. Part 34 now combines part number 33 and part number 34 into a single part number 34. This is shown in figure 83.

## STEP# 81

**Perform this step three times.**  
Glue Part #34 to the end of the

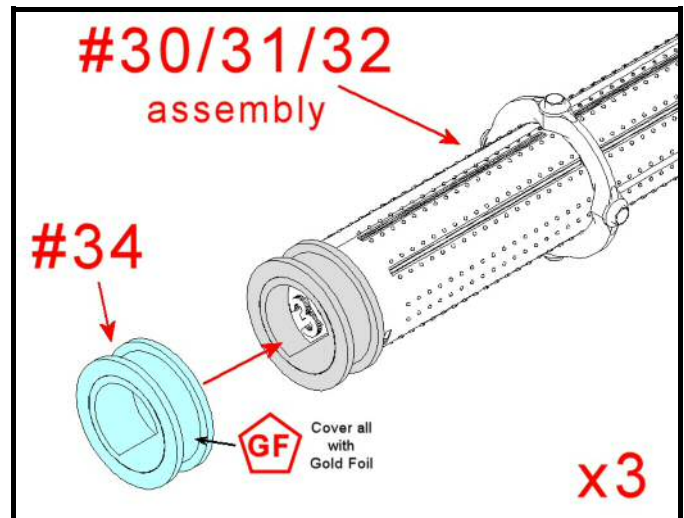
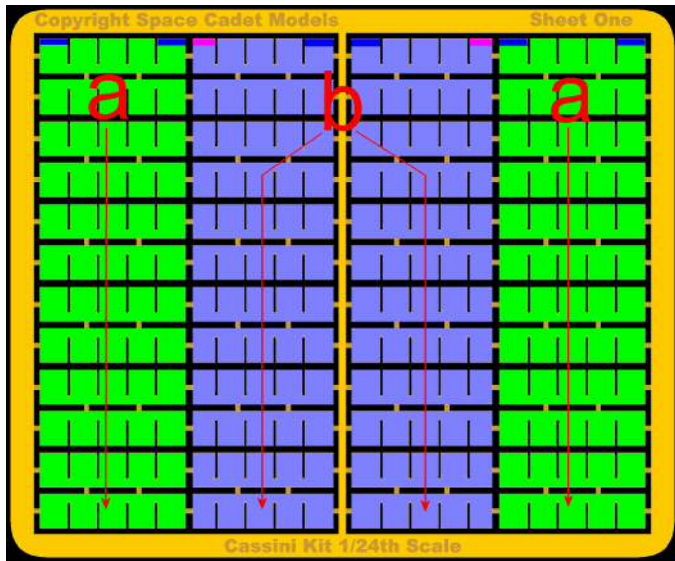


Figure 83

part number 1a and eight PE part number 1b. Tool# 2 is shown in



PE Sheet 1

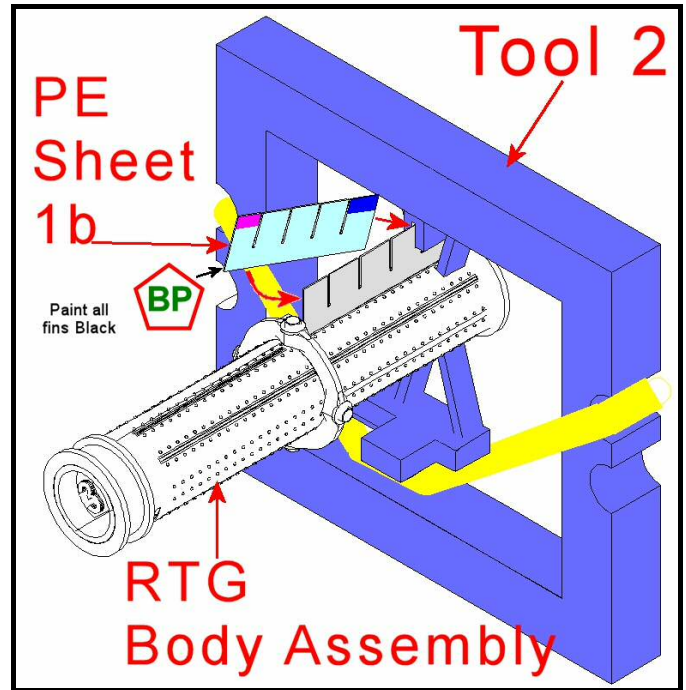


Figure 84

Figure 84. Place a rubber band under the tab and anchor as the yellow band shows in Figure 84. This provides tension to hold the body of the RTG between the fingers of the tool while adding the fins. Start with the body rotated so that one of the bolts on the center ring is straight up, as shown in Figure 84. Add one of the PE part 1b, by sliding it into the slot on the body, and between the two fingers that will hold the fin while the glue dries. Slide it all the way forward. Note the alignment, PE part number 1b is shorter than 1a.

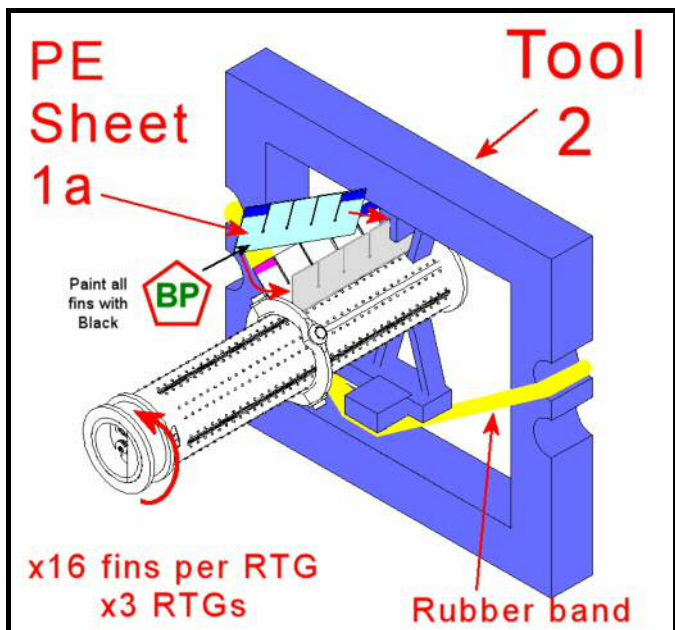
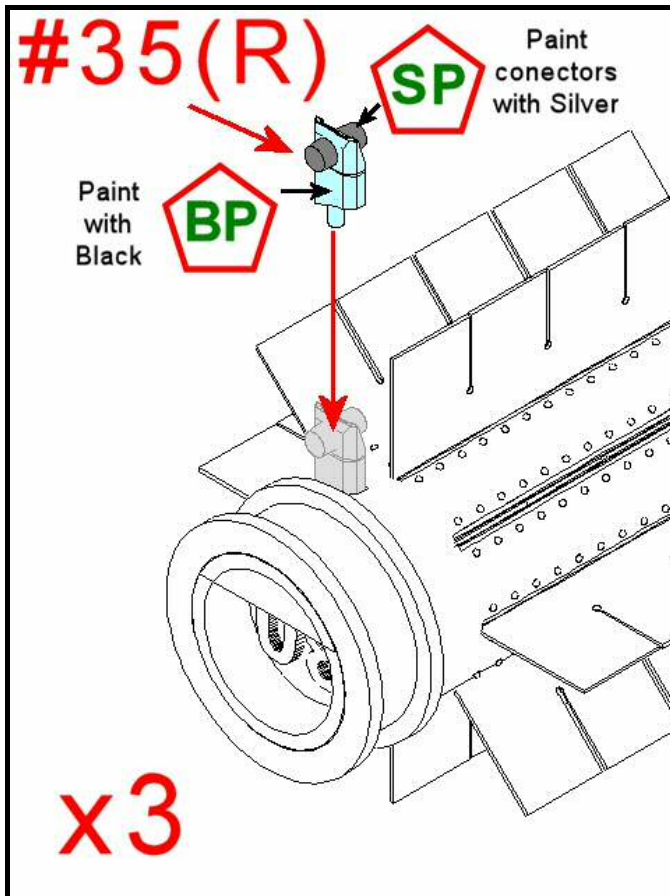


Figure 85

Also note the colored tabs in Figure 84. The blue tab is toward the front of the RTG body and the pink is to the rear. These are noted in the image of the PE sheet 1 as well. Gently pull down on the tension arm of Tool# 2 to release the fin so you can rotate the body of the RTG to the next slot. Re-apply the tension and slide a PE part 1a into the slot, sliding it all

the way forward. Note that PE part 1a has two tabs of blue. These fins can be oriented in either way, as they are the same. Repeat this for the rest of the fins making sure all the short fins are installed where the bolts are up. Once all eight are installed, turn the body around and add the remaining eight fins in the same order.



## STEP# 82

Preform this step three times. Find part runner number 35. There was not enough room to number the three parts on this separately, so it has R, T and G under the three parts on the runner. Find part number 35R and glue it into the position, as shown in Figure 86.

## STEP# 83

Preform this step three times.

Figure 86

Find Part numbers 35T and 35G and glue them to the end of the RTG in the positions, as shown in Figure 87. Set all three assemblies aside for a later step.

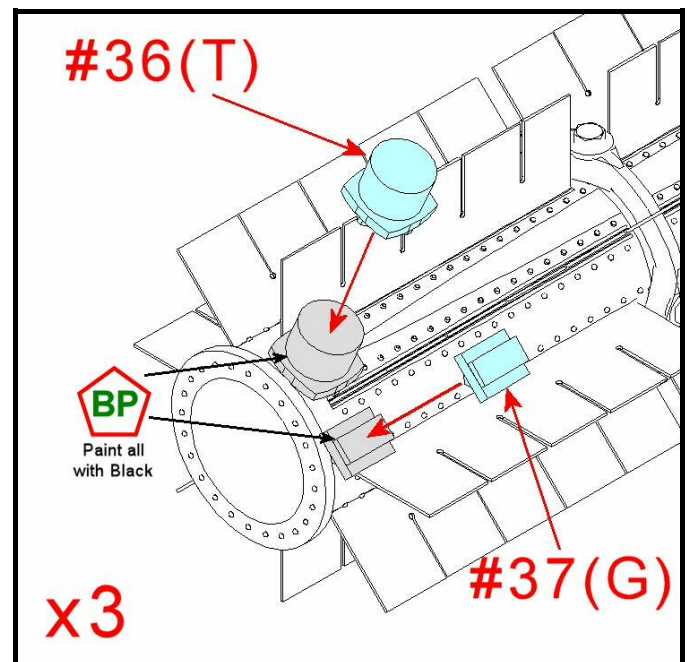


Figure 87

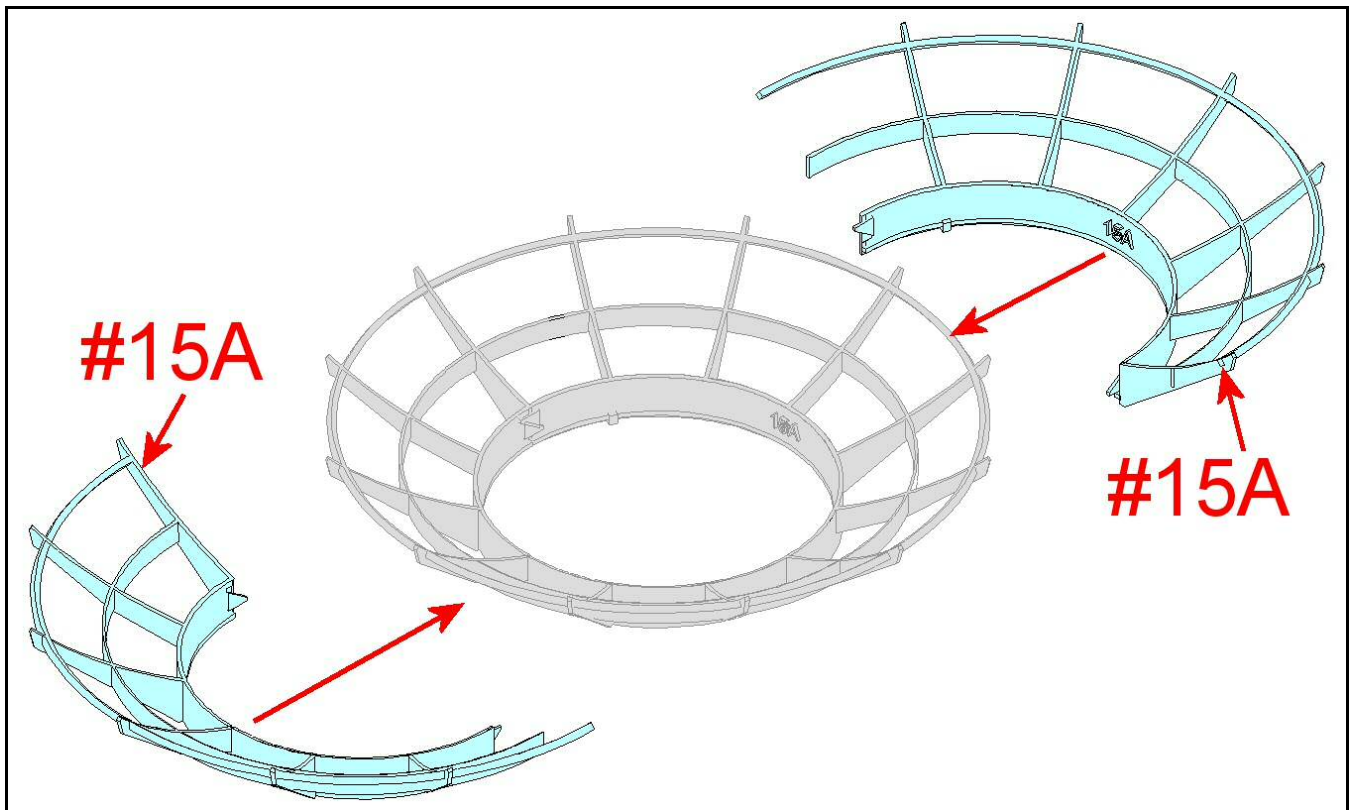


Figure 88

## STEP# 84

Find the two identical Part number 15A, dish rib sections and glue them together as shown in Figure 88. Pay attention to make sure the inner ring walls are flat and flush on the bottom edges.

## STEP# 85

Glue Part number 15B to the bottom of the ribs from Step 84 making sure the molded number “15B” is facing into the dish. Also make sure one hole is in line with one of the large ribs.

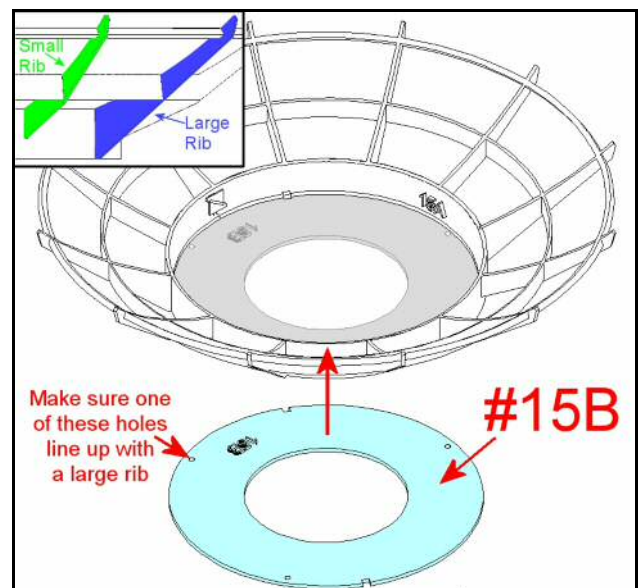


Figure 89

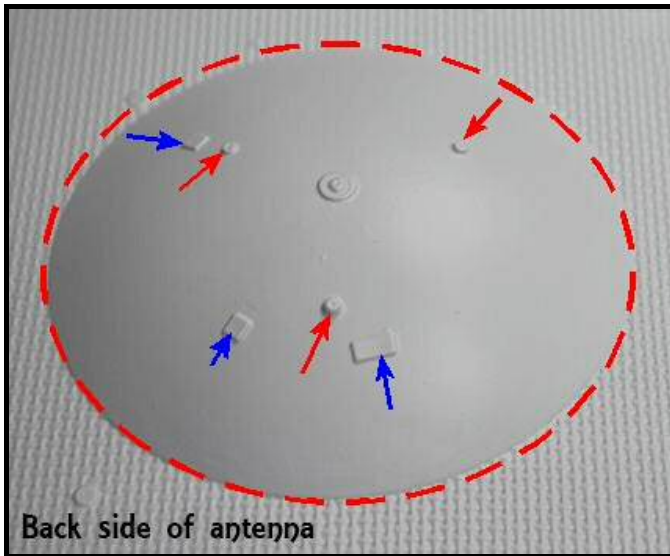


Figure 90

## STEP# 87

Find part number 15 and glue the dish to the ribs. Make sure that you align the rectangular hole, in the dish, with the large rib that has the mounting hole next to it, as shown in Figure 91 and noted in the insert with a

## STEP# 86

Find the vacuum formed dish and trim the plastic from around the diameter of the dish (See page 71). Also cut out the three small raised circles, the one large raised circle, the two raised squares and the one raised rectangle, as pointed out in figure 90.

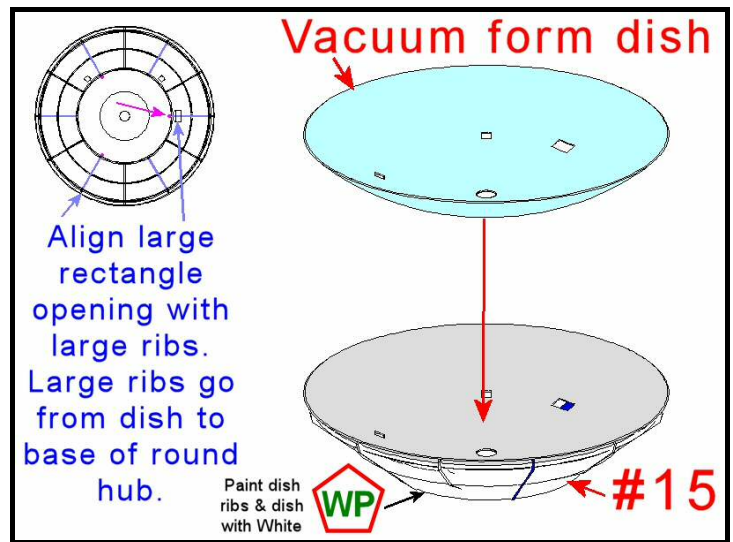


Figure 91

pink arrow.

## STEP# 88

In this step we start assembling the antenna feeds for the spacecraft. Find part numbers 18 and the runner with parts 19 and 20. Look at Figure 92 and notice that the parts with 19 pointing to them are color coded. There are two of every length and they are

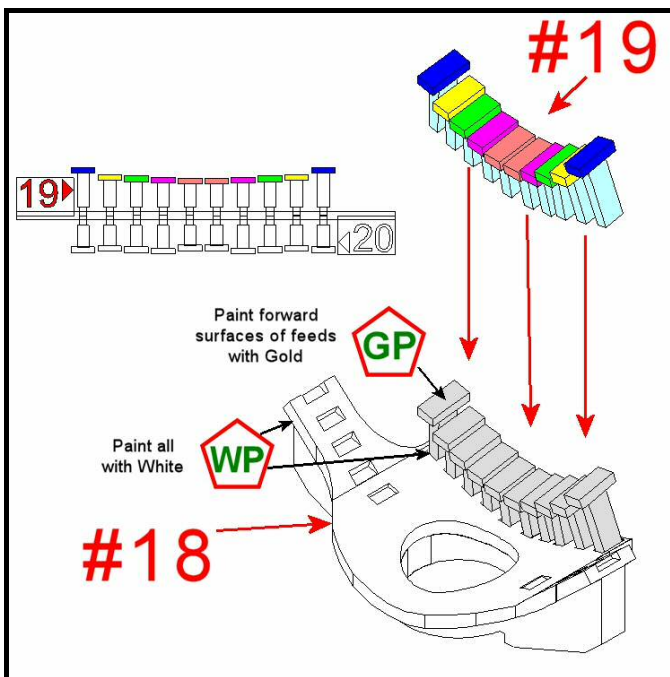


Figure 92

glued to part number 18 in the order that is shown in figure 92. Note that if they are all still attached to the runner, they are in the order to be glued to part number 18.

## **STEP# 89**

Now glue the parts numbered as 20 to part number 18. As before, note the color coded order shown in Figure 93. They also are on the runner in the order of use.

## **STEP# 90**

Find part number 17 and glue it to the bottom of the antenna feeds, as shown in Figure 94.

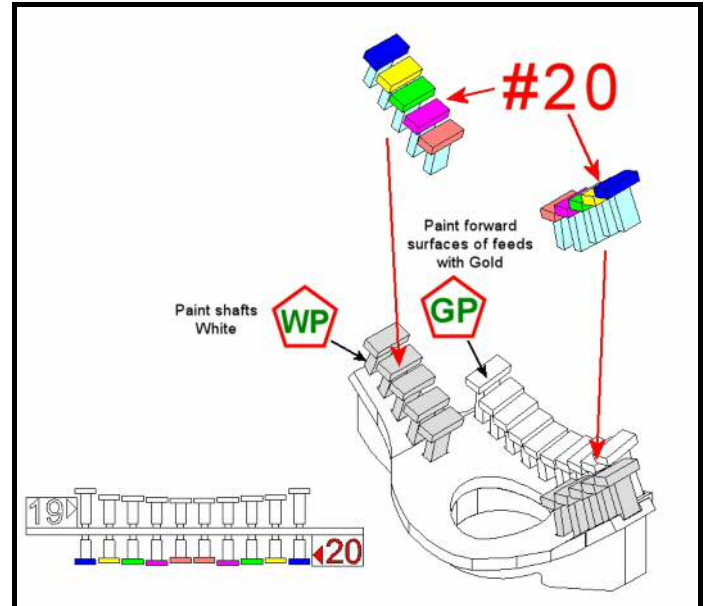


Figure 93

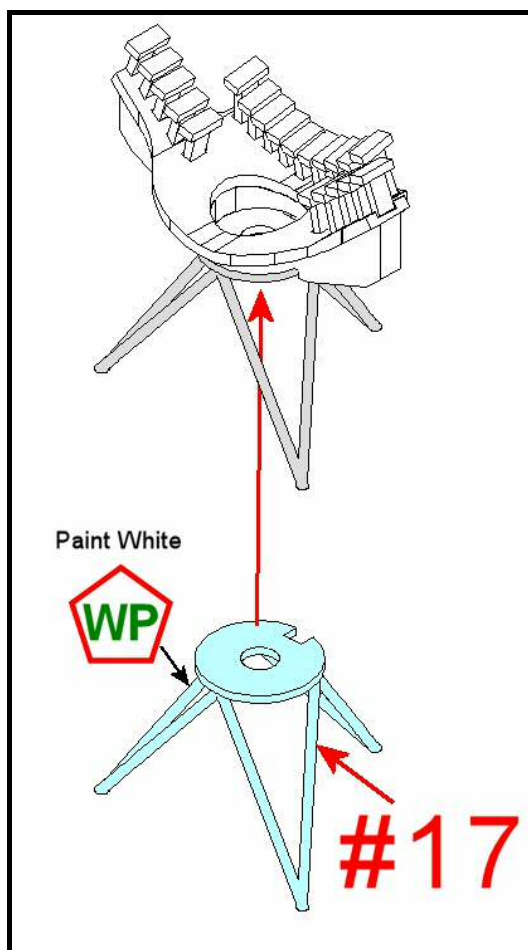


Figure 94

## **USE CAUTION**

Part number 17 is a 3D printed part that uses a rather brittle material. Although this process makes for very detailed parts, it does make the handling without damaging the part, more difficult.

## **STEP# 91**

This step you add the main dish feed to the multi-feed assembly. Find part number 21 and glue it into the center hole of part number 17, as shown in Figure 95. This completes the feed assembly for the main dish.

## **STEP# 92**

Now glue the feed assembly into the middle of the dish antenna. Note the alignment as shown in the insert of Figure 96. As you look down on the dish and feed assembly the rectangular hole in the dish should be in the 3:00 o'clock position and the radar feeds to the right of the main feeds should also be at the 3:00 o'clock position.

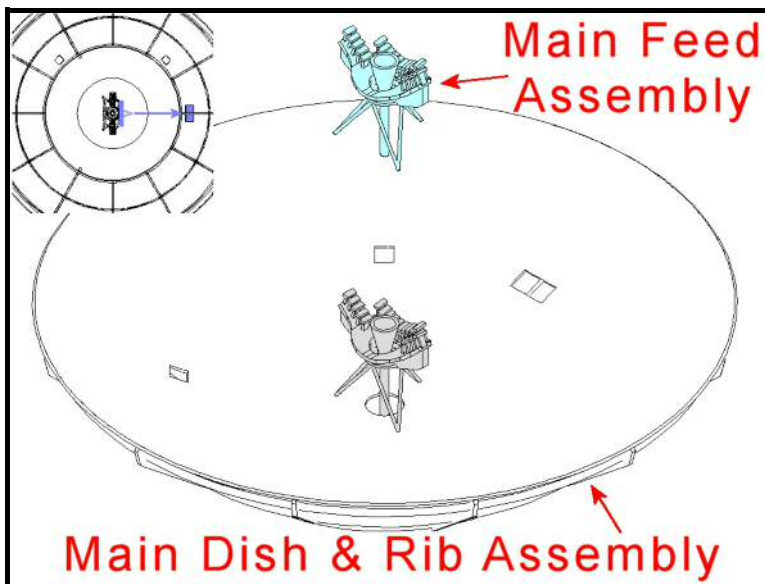


Figure 96

In the following Steps you will build the main dish antenna tripod with the secondary reflector and Low Gain Antenna 1. For these steps, we have provided Tool number 3. Tool number 3 is made from Tools part 3A and Tool part number 3B. Mount Tool part 3A on top of Tool part 3B, as shown in Figure 95. Do not glue these two parts together, as you will need to separate them later.

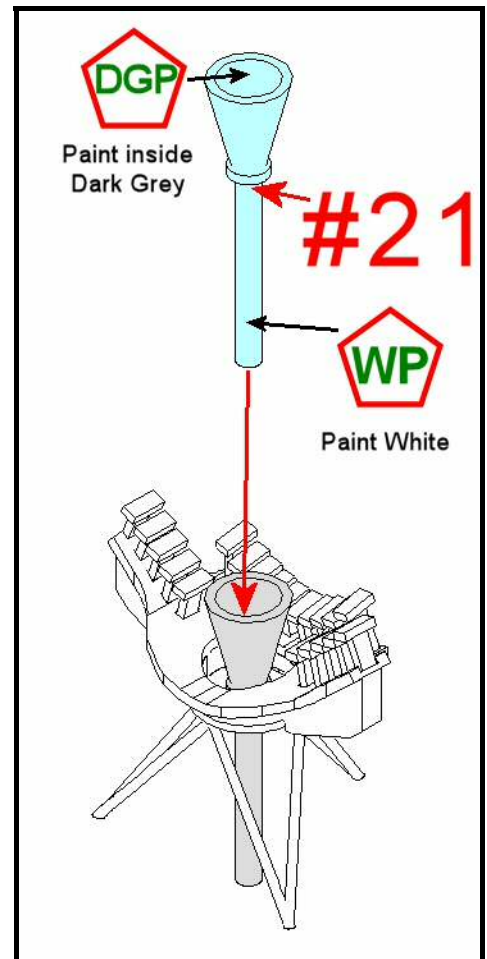


Figure 95

## **STEP# 93**

### **PLEASE NOTE:**

Several steps in this section require that you do not glue certain parts to others. They will be pointed out in the Figures as well as the Step text.

## STEP# 94

Find Tool 3 parts A and B and assemble them as shown in Figure 97.

Do not glue Tool parts 3A and 3B together. They will need to be separated later.

## STEP# 95

The kit includes two .055 inch diameter rods that are about 7.5 inches long. You will need to cut these into three lengths of 2.35 inches each. To help you gage this length we have included a cutting guide. To help you gage this length we have included a cutting guide. You can print Figure 98 and use it to mark your cuts. To insure the print out is correct there is a scale bar that should be exactly 1 inch when printed.

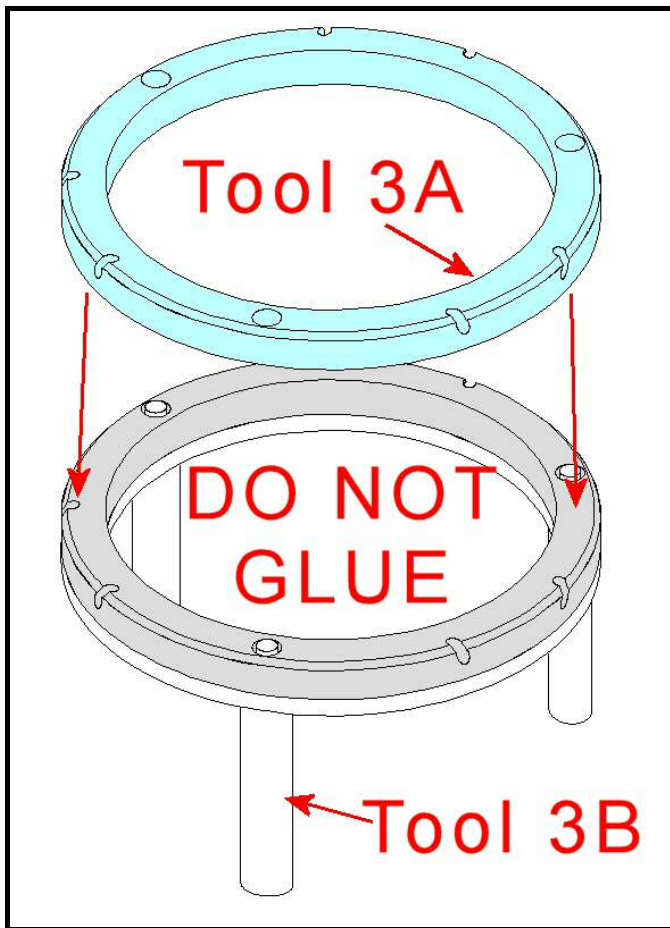


Figure 97

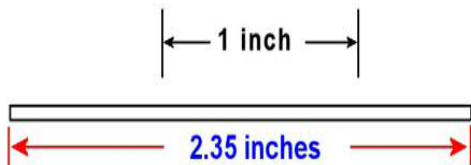


Figure 98

## STEP# 96

Find Figure 159, print it so the box is exactly one inch wide and tall. On a flat surface, set the combined Tool# 3 on the template and place the rods that were cut in Step 95 in the angled slots on the Tool# 3A/B as shown in Figure 98. See text with Figure 159

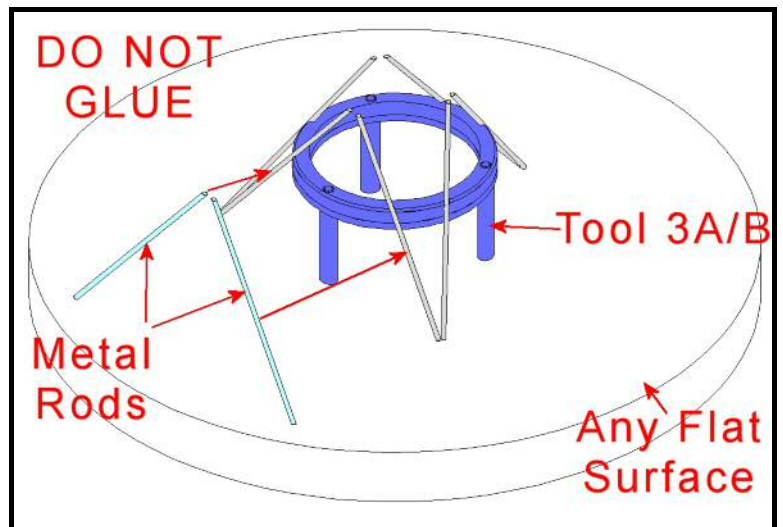


Figure 98

## STEP# 97

Glue the lower tips, that are resting on the flat surface, together. Find part number 22 and glue it to the top of the rods to complete the antenna tripod as in Figure 99.

## STEP# 98

Find the Low Gain Antenna 1,

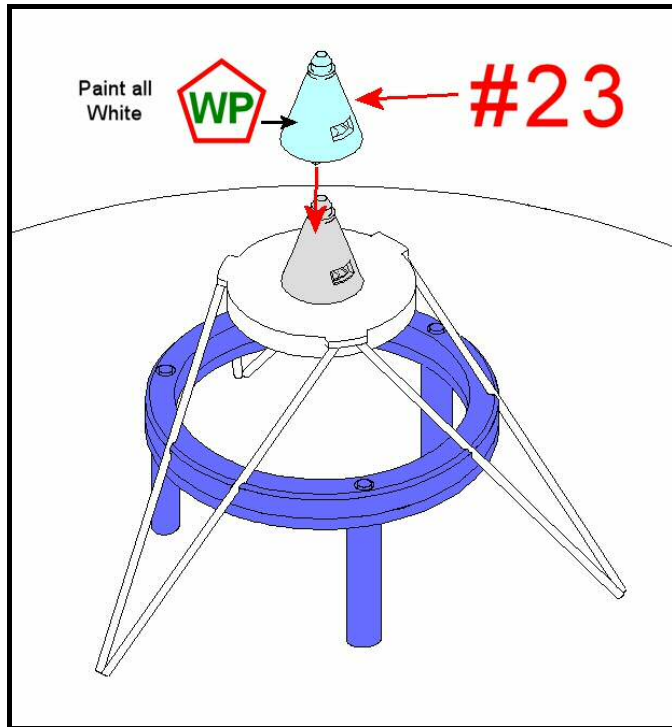


Figure 100

shown in Figure 101.

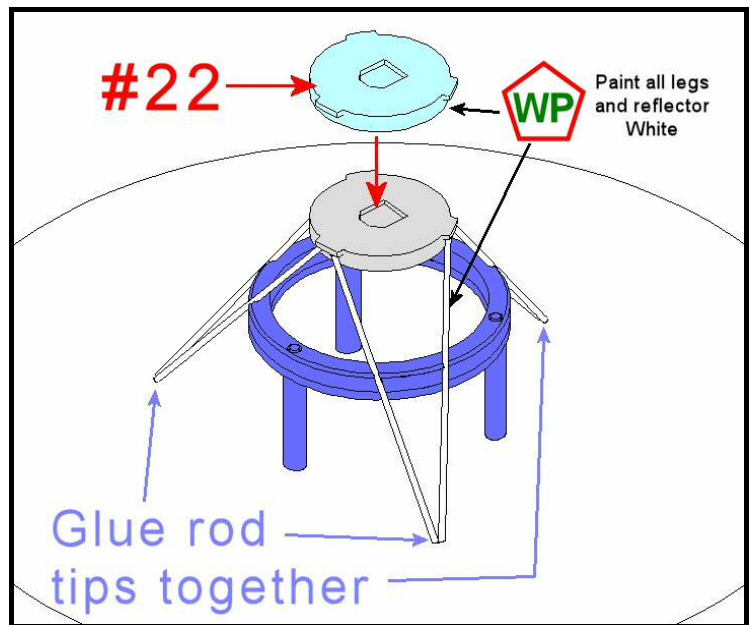


Figure 99

part number 23 and glue it to the top of the secondary reflector and tripod assembly as shown in Figure 100.

## STEP# 99

Find part number 24, the LGA cable connector, and glue in into the recess on part number 23, as

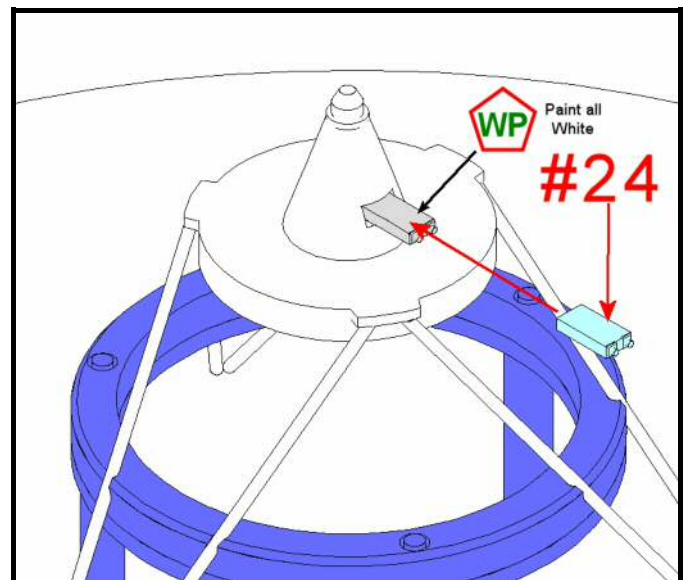


Figure 101

## STEP# 100

If preparation to glueing the Secondary antenna tripod into the main dish antenna, remove Tool 3B from the assembly, as shown in Figure 102.

## STEP# 101

Rotate the dish antenna so that the large rectangle is to the right of center, or the 3 o'clock position. Rotate the tripod assembly so that the connector, part number 24 is to

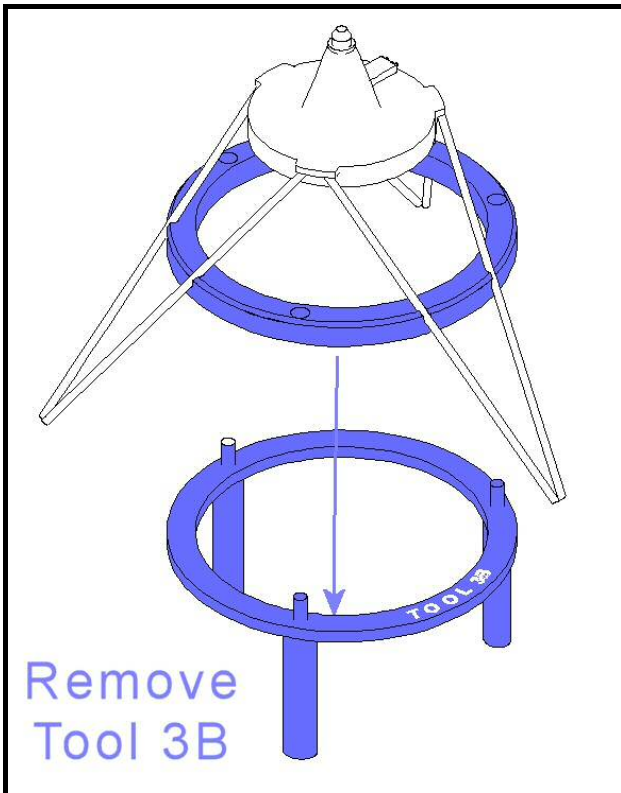


Figure 102

the top 12 o'clock position and glue the tripod to the center of the dish as shown in Fig. 103. The correct position will have one set of legs touching or very nearly touching the inner edge of the rectangular opening.

### Please Note:

There is an option to remove the tripod Tool 3A before setting the tripod down for glueing. However, leaving it in place could provide

strength and alignment to the tripod legs while the glue sets. However, if you decide to leave the tool 3A in place, be very careful when you remove it not to damage the antenna feeds from Step 92

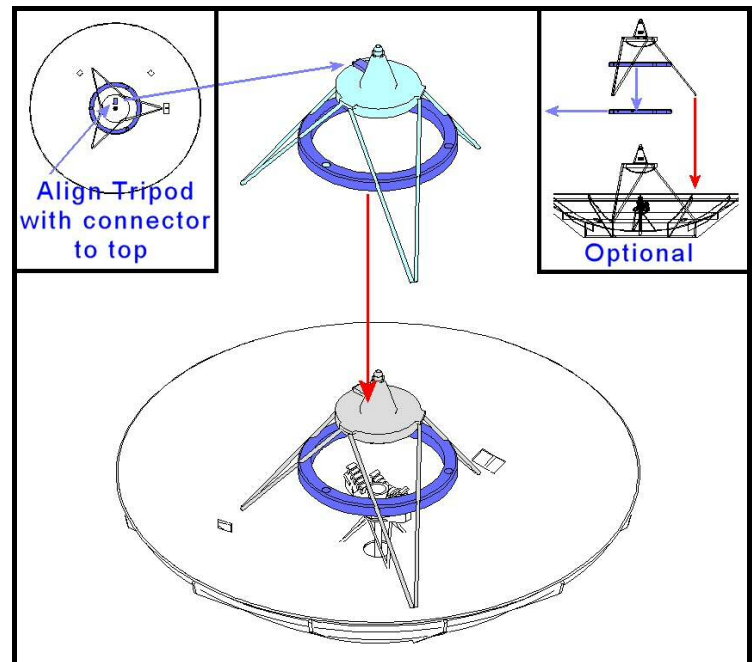


Figure 103

## STEP# 102

Find both part number 106s, the two sun sensors, and glue them in the positions as shown in Figure 104. Note: the square part of the sensors should stick slightly through the two square holes in the dish. The bases of the sensors will glue to the inner circle of the dish ribs. This completes the dish antenna short of mounting it to the spacecraft bus.

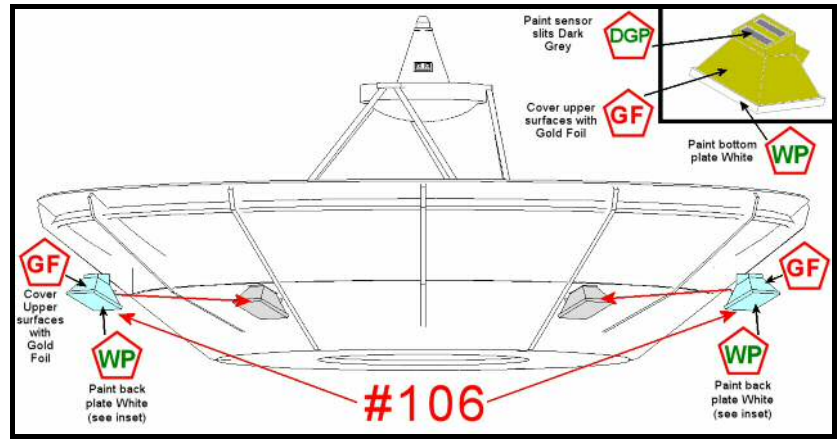


Figure 104

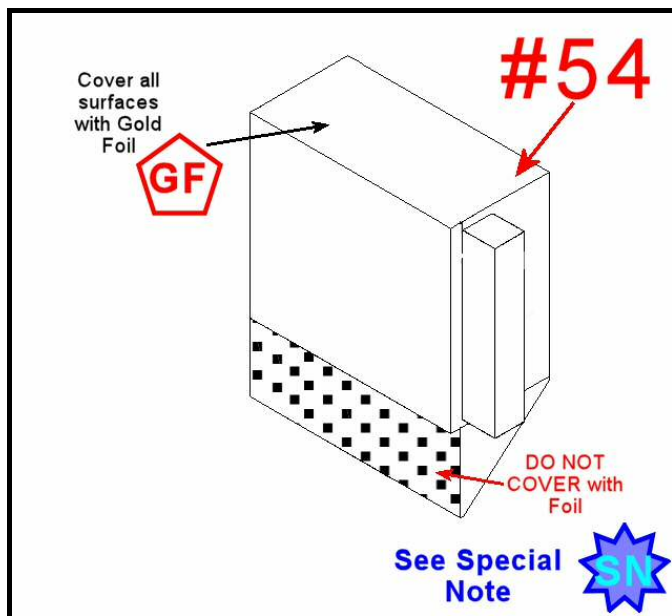


Figure 105

## STEP# 103

Find part number 54. Glue foil to cover the penthouse box as shown in Figure 105.

## STEP# 104

Glue the Penthouse assembly to the position shown in Fig. 106. The rear cover lip should rest on the bus' top lip and the triangular section will glue to the side of the bus.

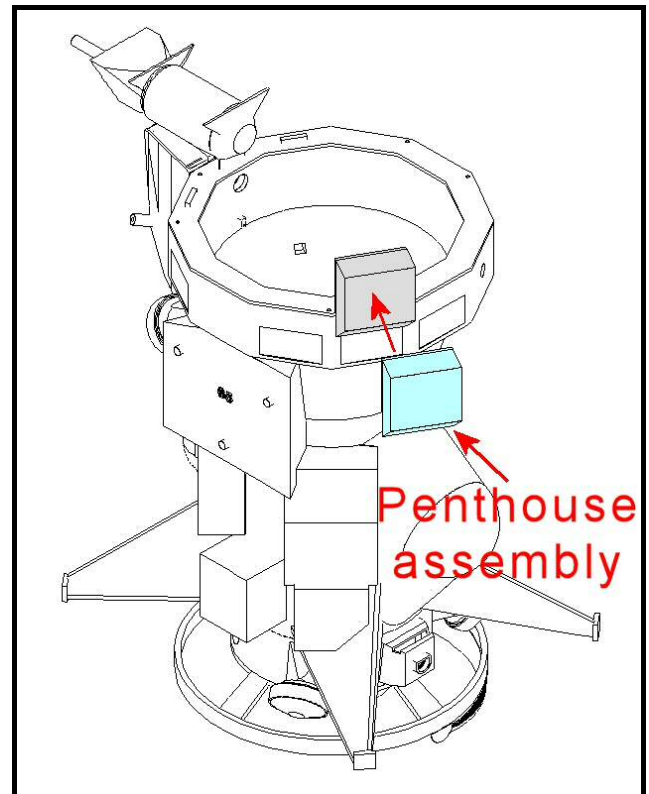


Figure 106

## STEP# 105

Find both part 99s, the two electronics boxes, and glue them to the top of the bus on either side of the magnetometer canister as shown in Figure 107. The bus has two raised tabs that the parts glue to (see Figure 27, to either side of the canister).

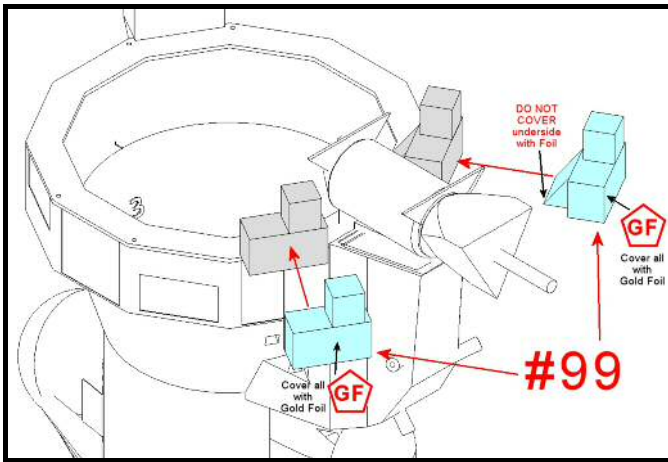


Figure 107

## STEP# 106

Find one part number 100 and three part number 101 louvers. Glue them to the bus in the positions, as shown in Figure 108. All horizontal louvers are mounted with their fins tilted to the right and the vertical louvers are tilted downward. See Figure 109.

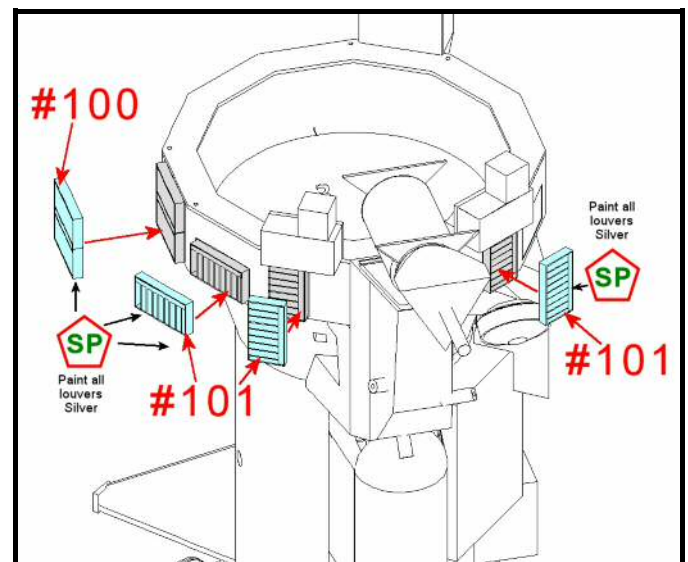


Figure 108

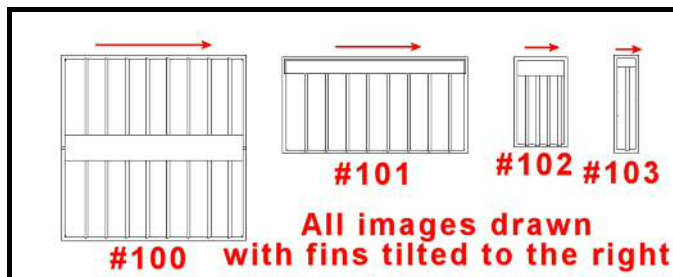


Figure 109

## STEP# 107

Find two part number 101 louvers and glue to the small electronic boxes, as shown in Figure 110.

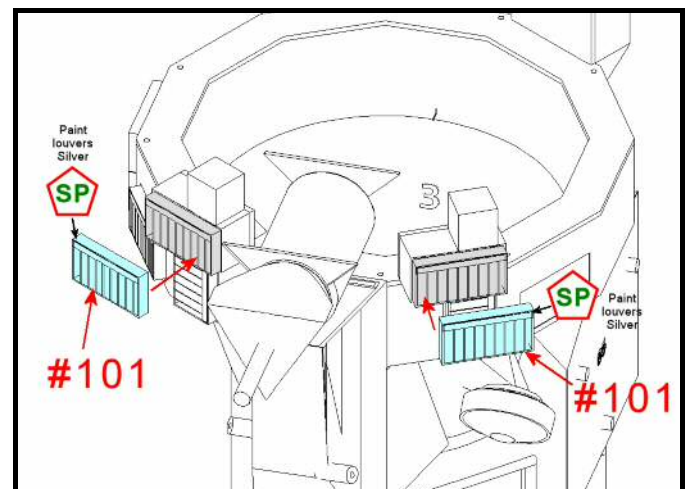


Figure 110

## STEP# 108

Find the second part 100 louver and four more part number 101 louvers and glue them onto the bus and Penthouse, as shown in Figure 111. Make sure all of them have their fins tilted to the right.

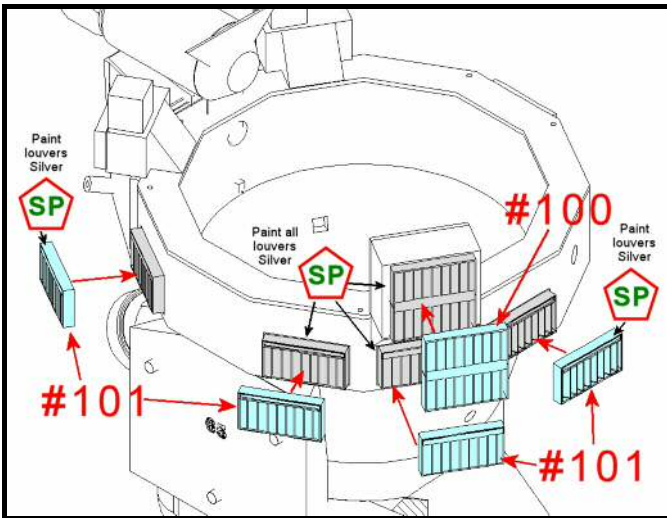


Figure 111

## STEP# 109

Rotate the body and glue the last part number 101 louver to the bus as shown in Figure 112. Make sure the fins tilt to the right.

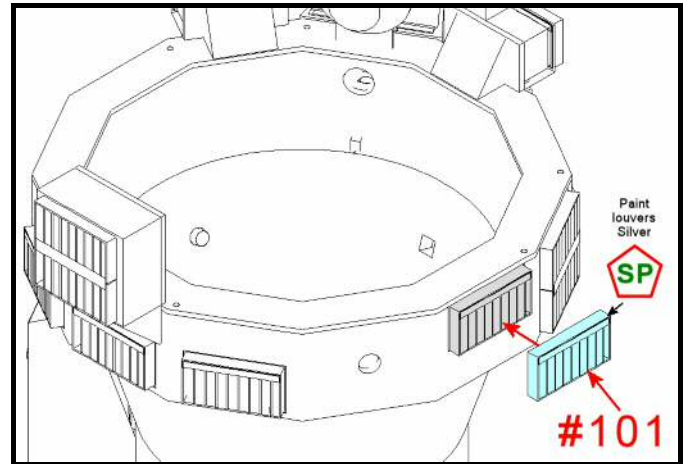


Figure 112

## STEP# 110

Find magnetometer canister shade, PE part number 3a on PE Sheet 3. Glue it to the triangle mounts that are on the top of the canister. Place the front edge of part PE 3a so that it just sticks over the front mount a small amount. The shade will overhang the rear of the canister. See

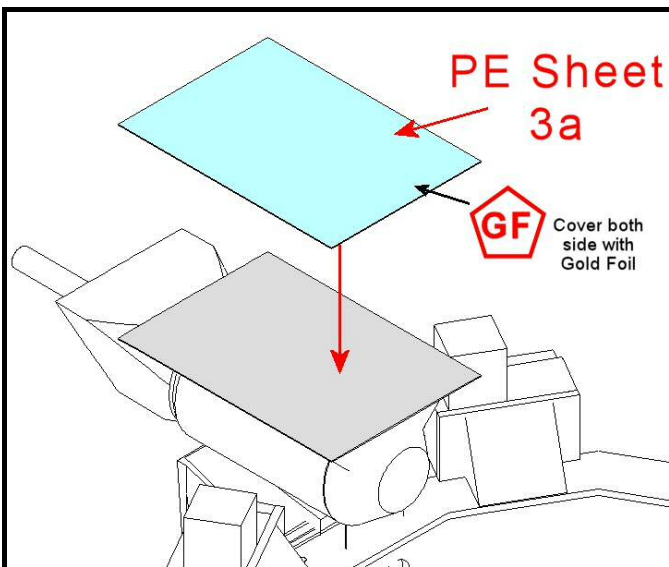


Figure 113

Figure 113.

## **STEP# 111**

Find the CDA assembly, completed in Step 38 and glue it into position, as shown in Figure 114.

## **STEP# 112**

Find the Fields Pallet assembly, completed in Steps 26 through 37, and glue it to the bus as shown in Figure 115.

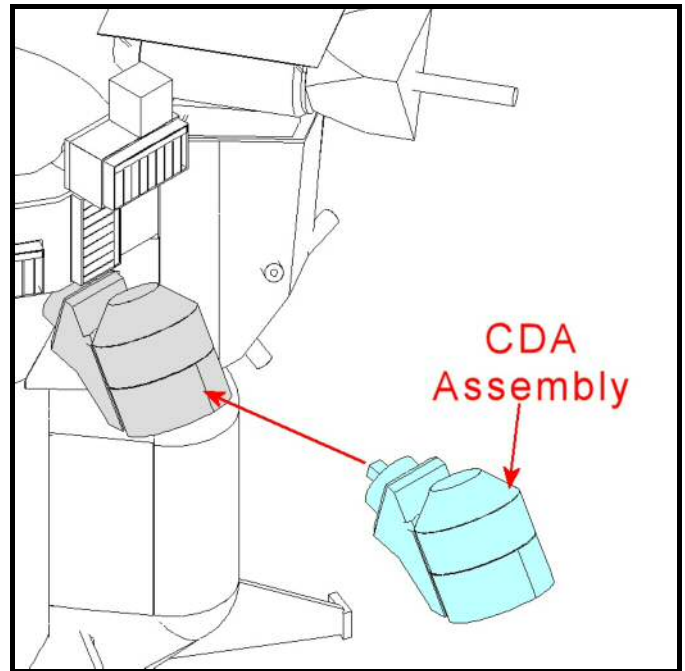


Figure 114

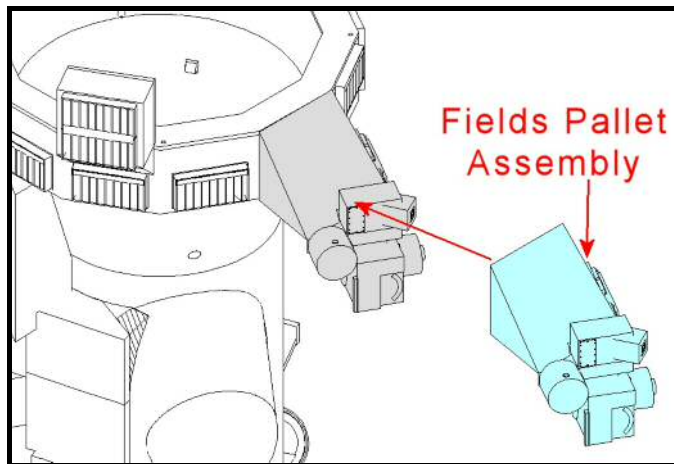


Figure 115

## **STEP# 113**

Find the INCA assembly, completed in Steps 71 through 76, and glue it to the body as shown in Figure 116.

## **STEP# 114**

Find the two each of part numbers 43 and 44. These are the RCS thruster pods. Test fit them to make sure you have the correct ones for each side, thruster nozzles pointing down and away from the body, as shown in Figure 117. Once you have identified the positions, glue the pods to the thruster arms.

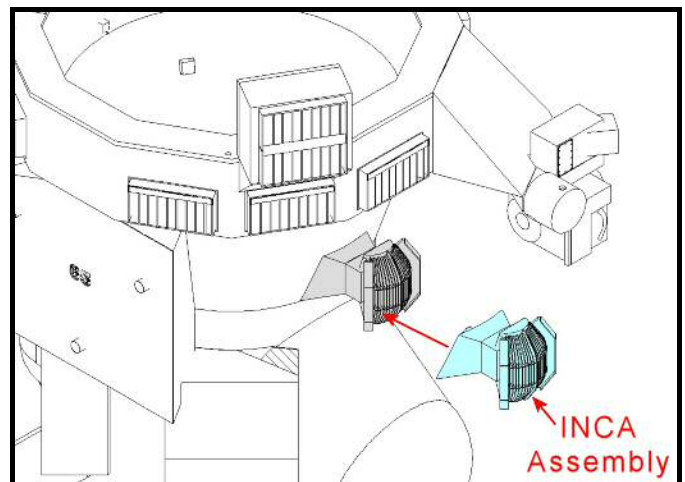


Figure 116

## STEP# 115

Find part number 91, the Low Gain antenna #2, and glue into place as shown in Figure 118. Part 91 has a tab on the underside that fits into a small slot on the engine cover ring. Glue the tab into the slot and the base to the body of the spacecraft.

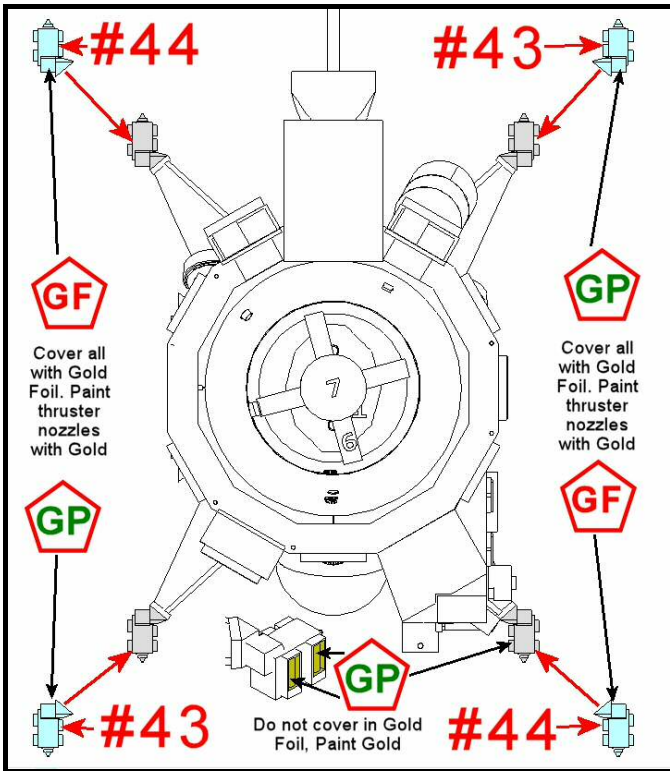


Figure 117

## STEP# 116

Find part numbers 47 and 49, the

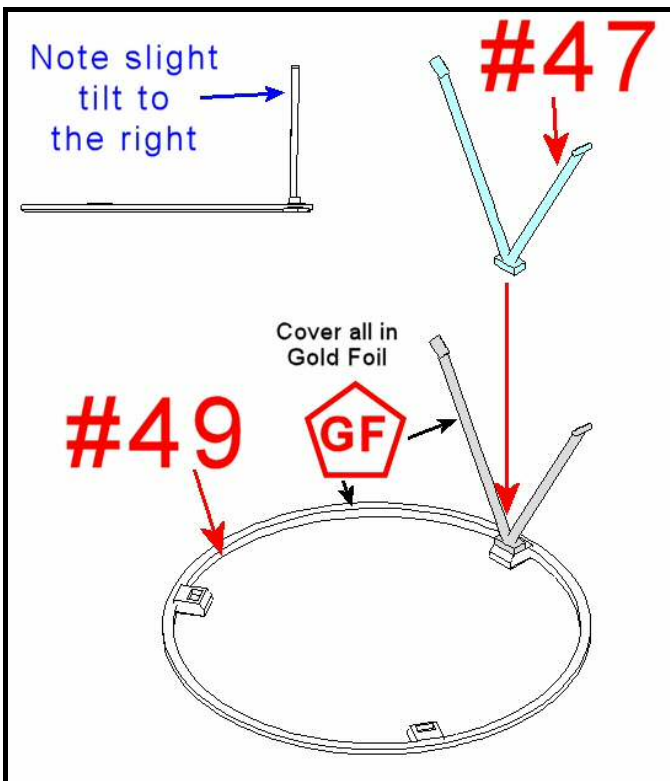


Figure 119

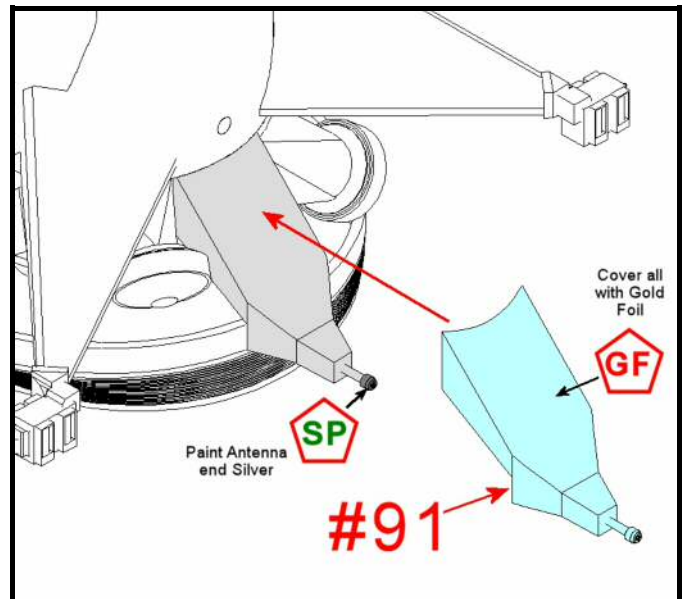


Figure 118

Huygens mounting ring and top mounting struts. Glue part number 47's mounting plate tab into one of the three ring plates, as shown in Figure 119. Make sure that when the struts are glued into place that they have a slight tilt to the right, as shown in Figure 119's insert.

## STEP# 117

Find part number 48, the remaining mounting struts and glue them to part number 49, as shown in Figure 120.

## STEP# 118

Find Tool 5 and tape it to the outside surface of the Huygens mounting ring with one leg in the 6 o'clock position, as shown in

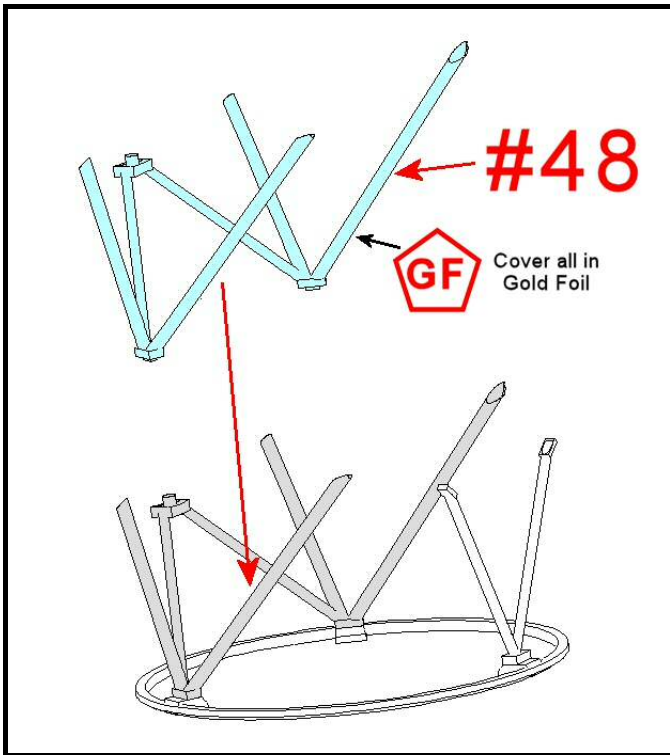


Figure 120

Figure 121. Please note, that the tool has lips at the outer tips of the arms to hold the mounting ring from the outside. **DO NOT GLUE** this tool, as it will need to be removed in a later step. Now glue into place the entire Probe mounting assembly, as shown in

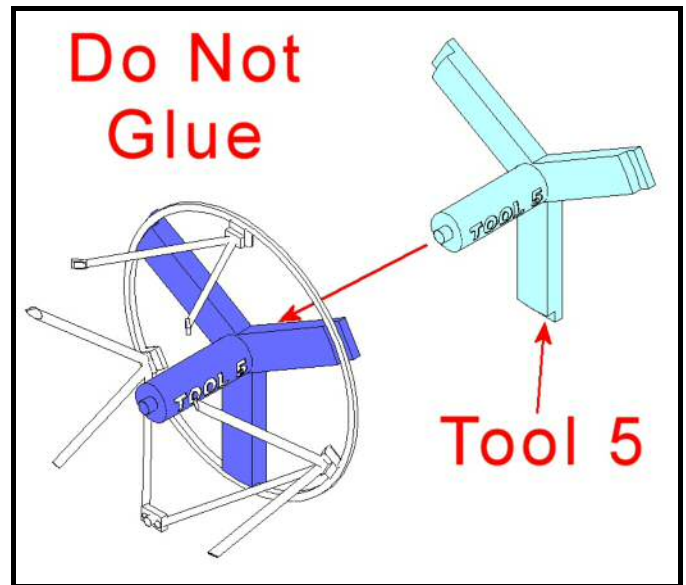


Figure 121

Figure 122. Note the position of the Low Gain antenna and the Fields pallet. Make sure that the pin on Tool 5 is inserted into the hole on the body tube and the tab on the lower mounting strut plate is glued into the hole the lower body.

**DO NOT GLUE Tool 5 tab to the hole in the body**

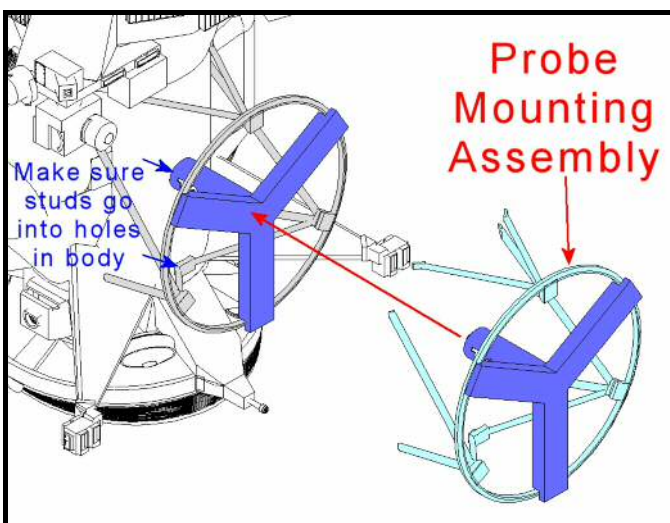


Figure 122

## STEP# 119

Find Aeroshell part number 45 and Heat shield part number 46, and glue them together as shown in Figure 123. Make sure the antenna teardrops are at the 2 and 6 o'clock positions. This makes sure one of the mounting indentations are at the 12 o'clock position.

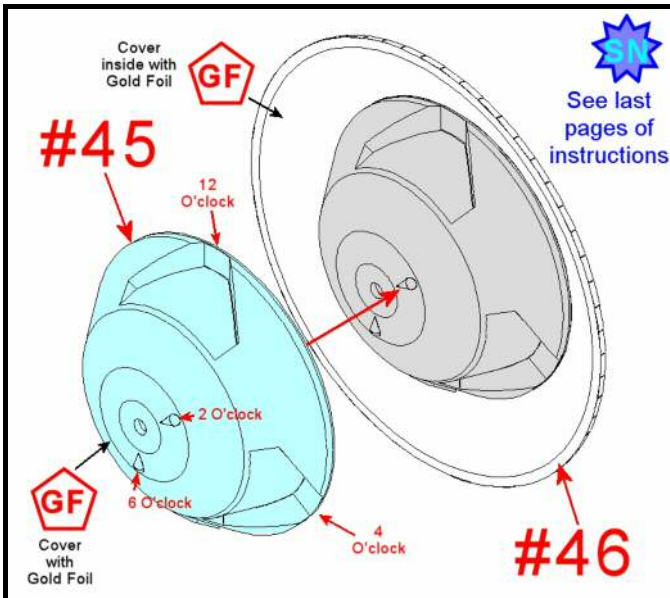


Figure 123

## STEP# 120

Remove Tool 5 from the Probe Mounting assembly, and glue the Heat shield and aeroshell assembly to the mounting struts, as shown in Figure 124. When properly placed the three pads on the mounting ring will glue to the three recesses in the Aeroshell.

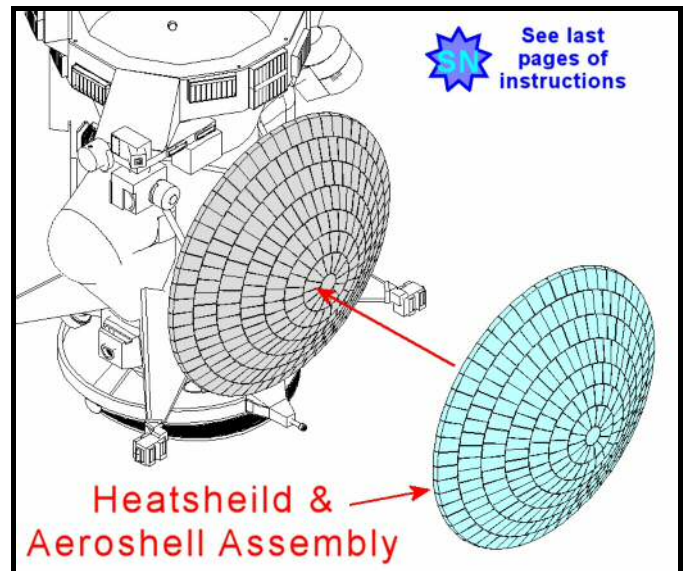


Figure 124

### NOTE:

Step 120 has two optional ways to mount the probe assembly to the spacecraft body. The first method is simply to add strength to the completed assembly. Find the 1/8th round clear acrylic rod and glue through the center hole of the Aeroshell and seat into the mounting cup on the inside of the Heatshield. When mounted, as in Figure 125, the rod will glue into the hole in the body. The second method uses the entire length of the rod to mount the Probe as if it had just been released a few seconds earlier, as shown in Figure 126.

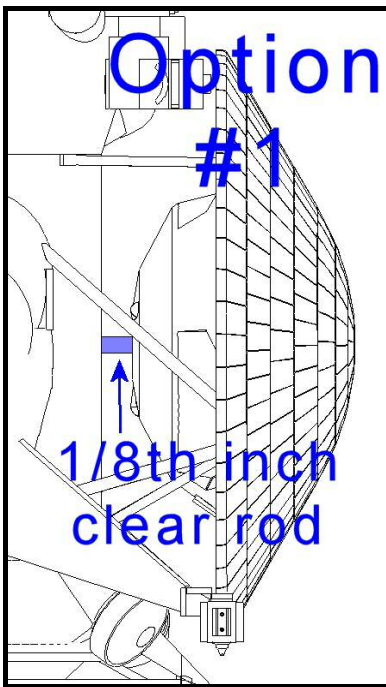


Figure 125

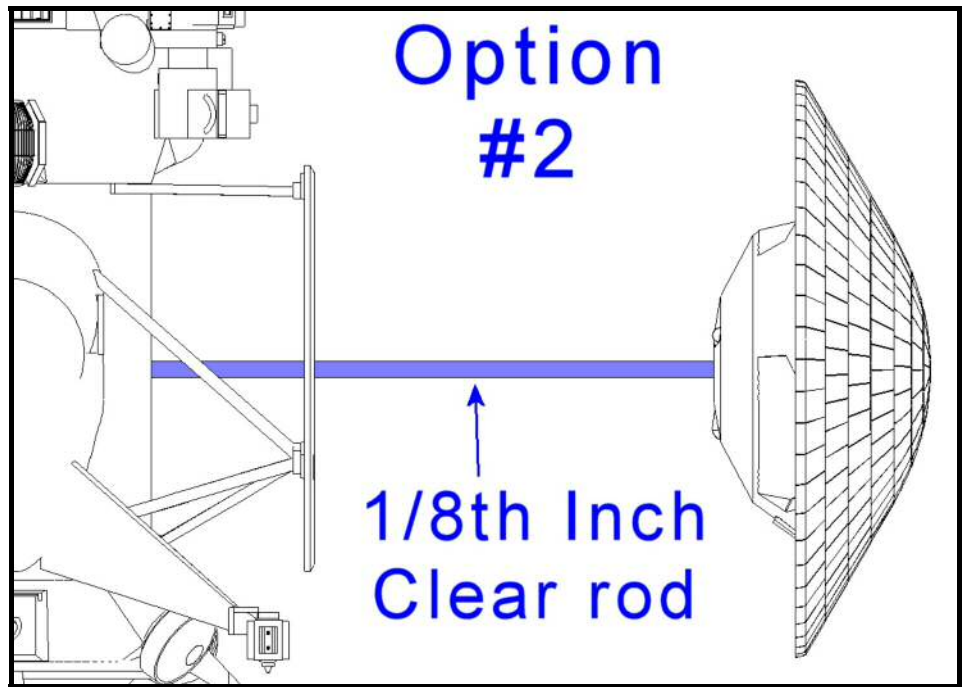


Figure 126

## **STEP# 121**

Find the RTG assemblies finished in Steps 78 through 83. Glue one into position as shown in Figure 127. This is the mounting just below the Helium tank (Part number 9).

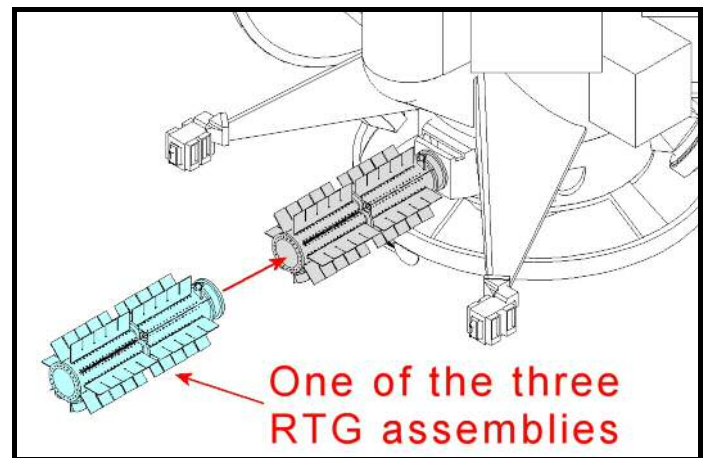


Figure 127

## **STEP# 122**

Rotate the body 180 degrees and glue the second RTG to the mount that is directly below the Monopropellant tank (Part number 8), as shown in Figure 128.

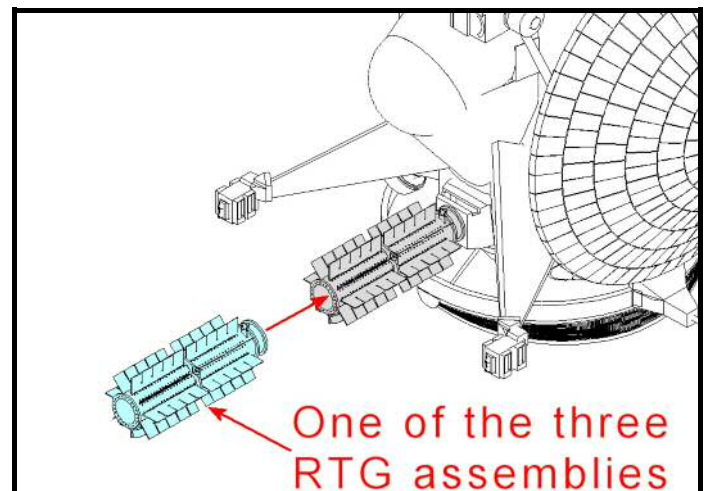


Figure 128

## STEP# 123

Find part number 39b, this is the final RTG mount and can be identified by the “D” tab that is turned to the right. Find Part number 95. This is the RTG shield the has a cutout on the left side as looking from the large outer rim toward the inside mounting tab.

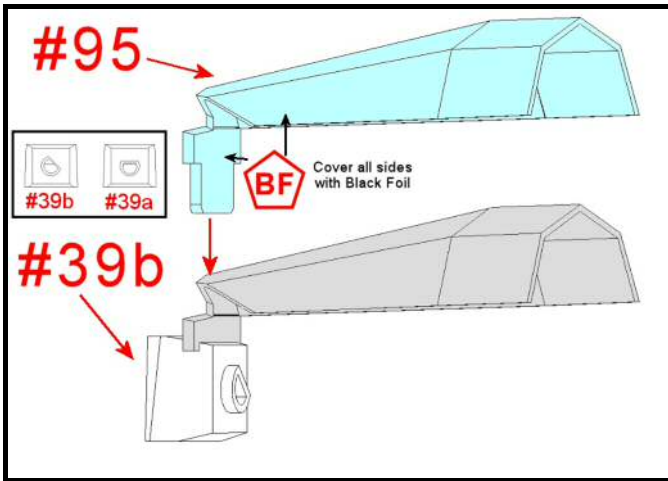


Figure 129

Glue part number 95 into the slot on the top of part number 39b. Make sure that the mounting tab is vertical as shown in Figure 129.

## STEP# 124

Test fit the assembly from Step 123 by sliding it into position as shown in Figure 130. The notch should allow the thruster arm to fit into the corner of the RTG cover. You might need to tip this assembly to allow a flush fit into the indentation of the body. **DO NOT GLUE** at this time. Now, while holding the cover assembly in place, test fit the final RTG. The

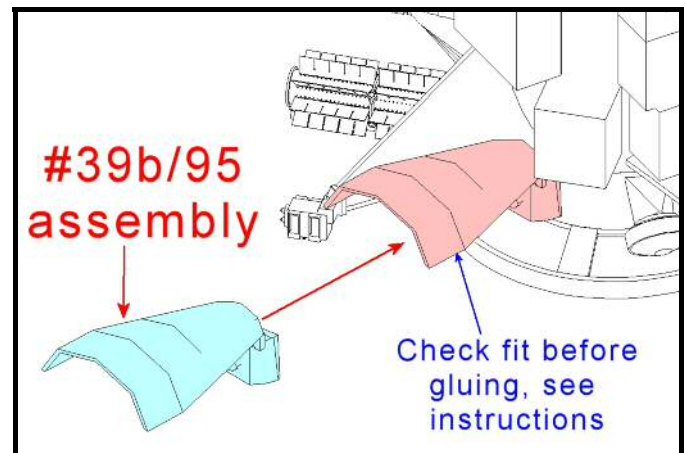


Figure 130

spacecraft had very little clearance between the thermal blankets of the thruster arm and the fins of the RTG. It may be possible that you will need to trim both the mounting tab of the mounting/cover to allow the mount to rotate just a little. You might also need to modify the RTG mounting “D” tab to allow the final position of the RTG fins to

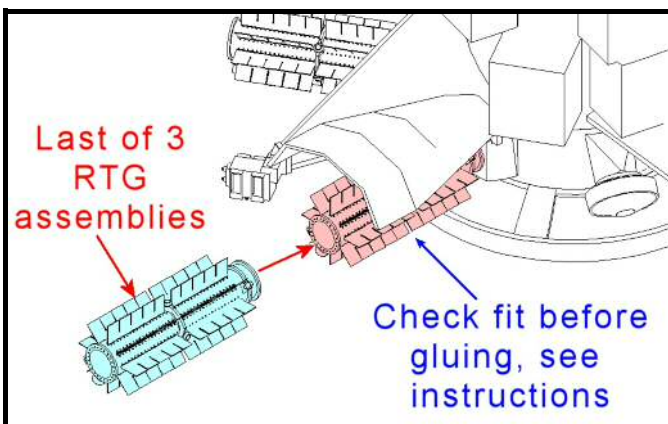


Figure 131

clear the thruster arm. Once the test fitting shows that all will fit together, glue the mounting/cover & RTG in place shown above.

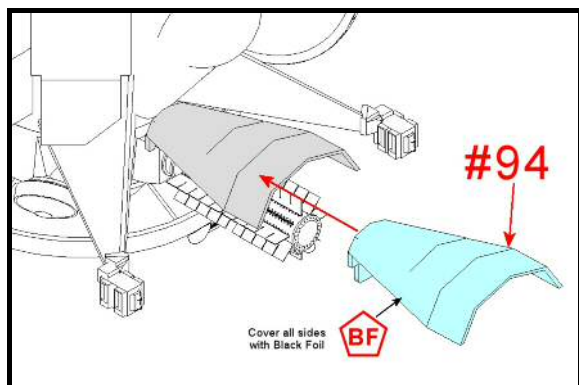


Figure 132

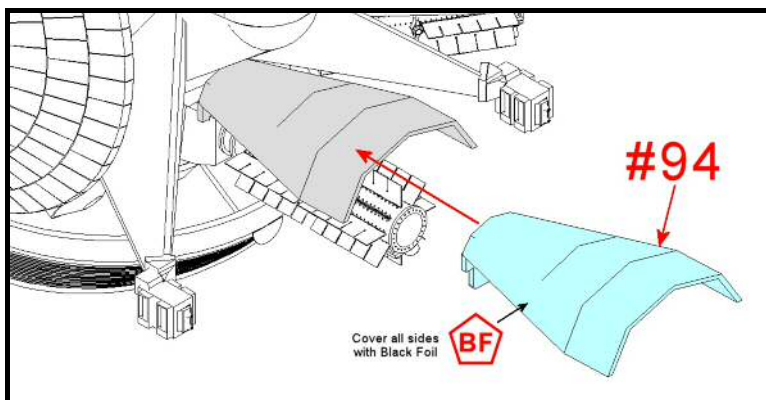


Figure 133

## STEP# 125

Find both part numbers 94 and glue into the slot of the two RTG mountings from Step 22, as shown in Figures 132 and 133. As in Step 123 make sure the cover mounting tab is glued in vertical to the mounting.

## STEP# 126

Find the plastic coated wire, that comes with the kit. Print Figure 134 so that the 1 inch bars are exactly one inch long. Use this

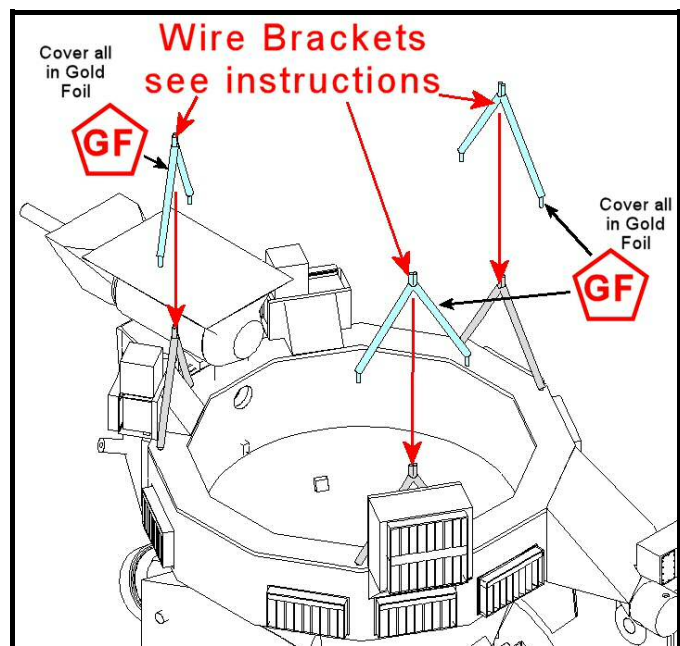


Figure 135

Figure to measure and cut the wire to length.

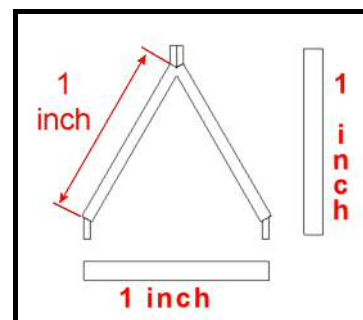


Figure 134

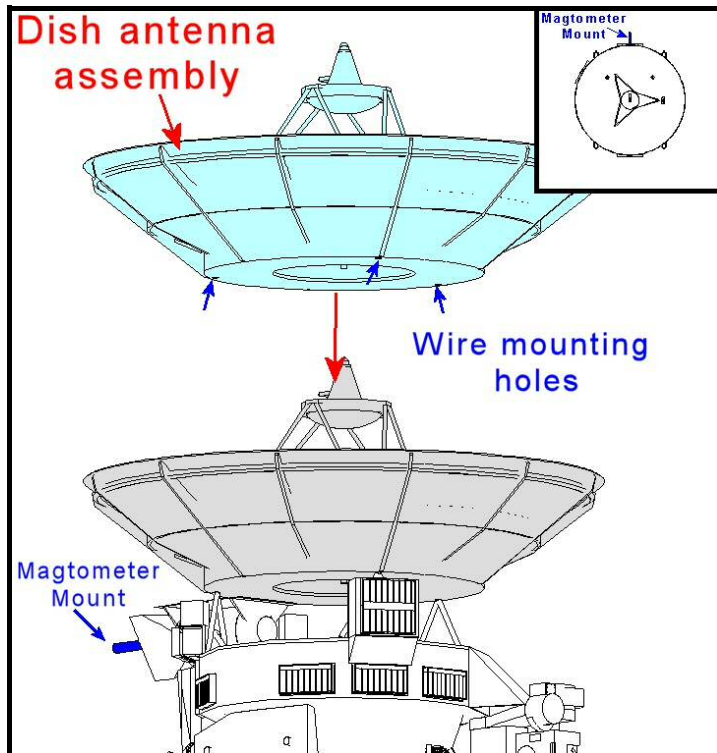
Assemble three so that the wires stick out from the plastic coating about as much as Figure 134 shows. These are glued onto the top of the bus by

inserting the wire into the holes in the bus, as shown in Figure 135.

Try to make sure they are totally vertical.

## **STEP# 127**

Glue the Main Dish assembly to the three mounting struts you installed in Step 126, by gluing the wires into the three holes, as shown in Figure 136, in the bottom of the dish ribs. Make sure that you install it in the alignment as shown in the insert in Figure 136. The magnetometer mount should be at the 12 o'clock position and the

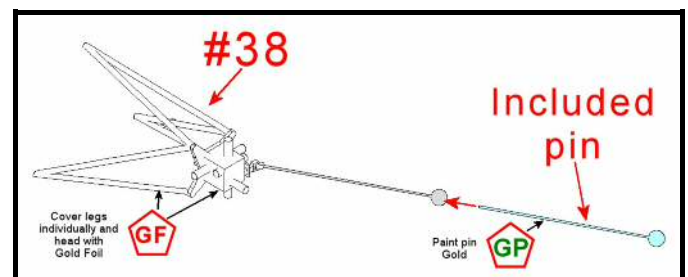


**Figure 136**

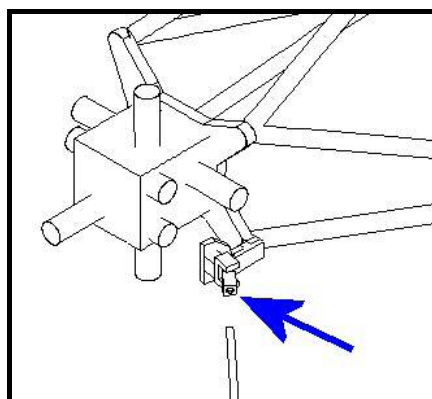
antenna should be at 3 o'clock.

## **STEP# 128**

Find part number 38, the Radio Plasma Wave Magnetic Coil (RPWS-MSC) Assembly tripod and the sewing pin included with the kit. There is a small protrusion from the lower, right of the Coil

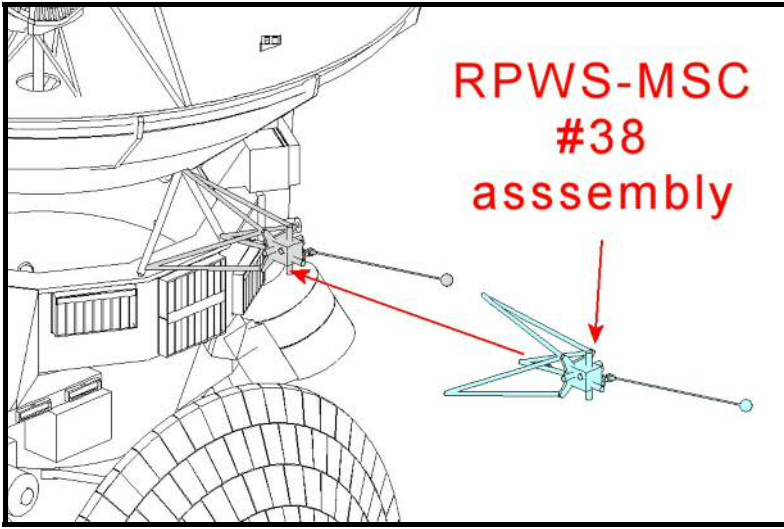


**Figure 137**



**Figure 138**

assembly that should have a small hole in the end, see Figure 138. If there is no hole try hand drilling a small micro hole for the pin to glue into. You can cut the pin to the exact length of 1 ½ inch, but leaving the point on it will make it easier to glue into the hole, as shown in Figure 137.



## STEP# 129

Glue the RPWS-MSC assembly in place on the spacecraft, as in Figure 139. It mounts to the Main Dish mounting struts just above the Huygens probe with the pin angling down and to the right.

Figure 139

## STEP# 130

Find the Main instrument pallet, completed in Steps 39 though 77, and glue it to the mounting plate installed in Step 20, as shown in Figure 140.

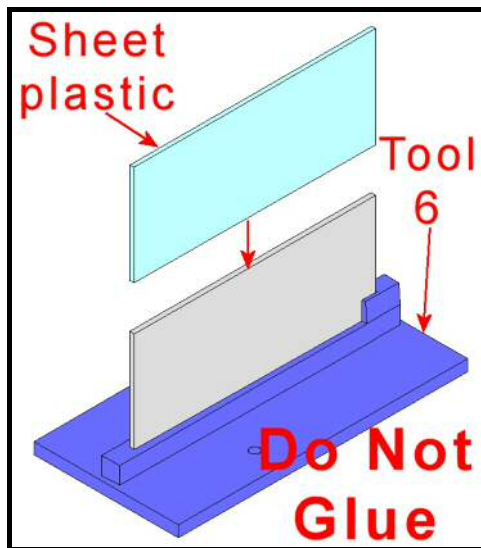


Figure 141

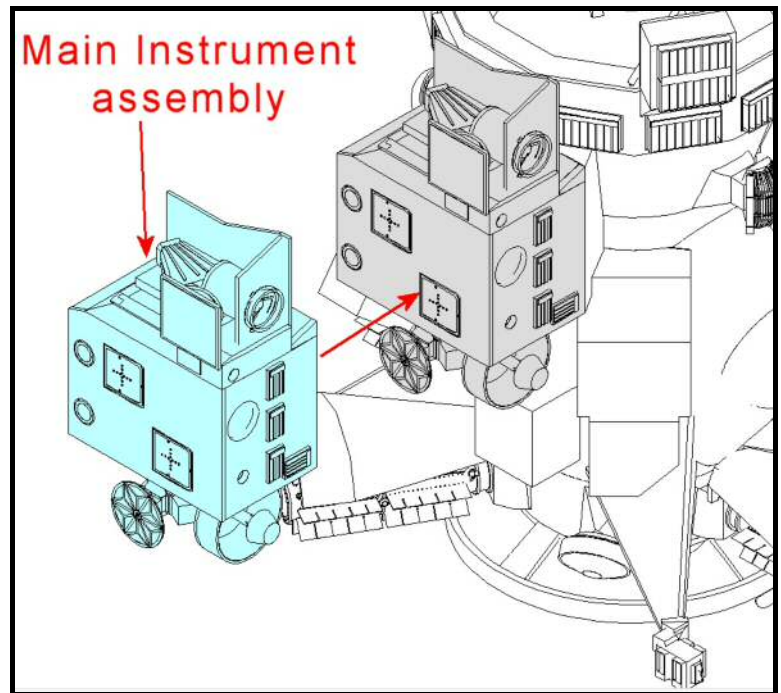


Figure 140

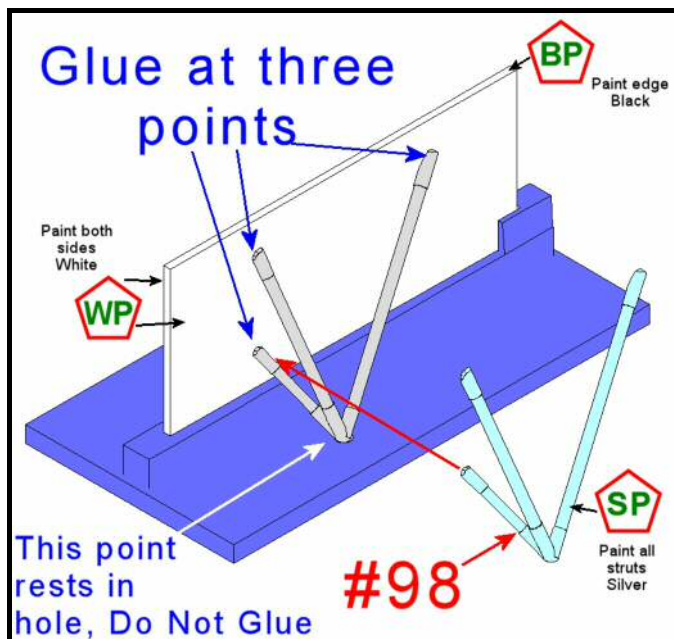
## STEP# 131

Find Tool 6 and the .030 plastic sheet that is included in the kit. Measure the sheet out to 1.7 inches long and .7 inches high, and cut to size. Place the sheet, edge on, in the tool as shown in Figure

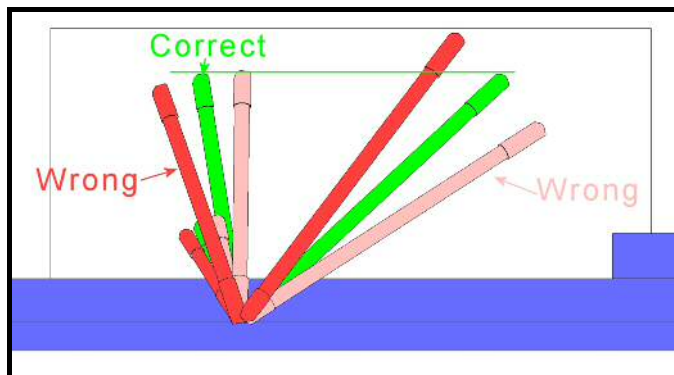
141. The Tool has a small slot to hold the plastic sheet vertical while you glue the mounting struts to it.

## **STEP# 132**

Find part number 98 and glue into position as shown in Figure 142. The junction point of all three struts, rests in the small hole in Tool 6. Please note the



**Figure 142**

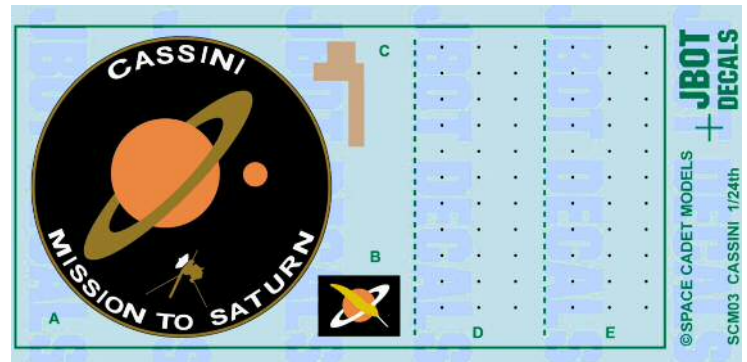


**Figure 143**

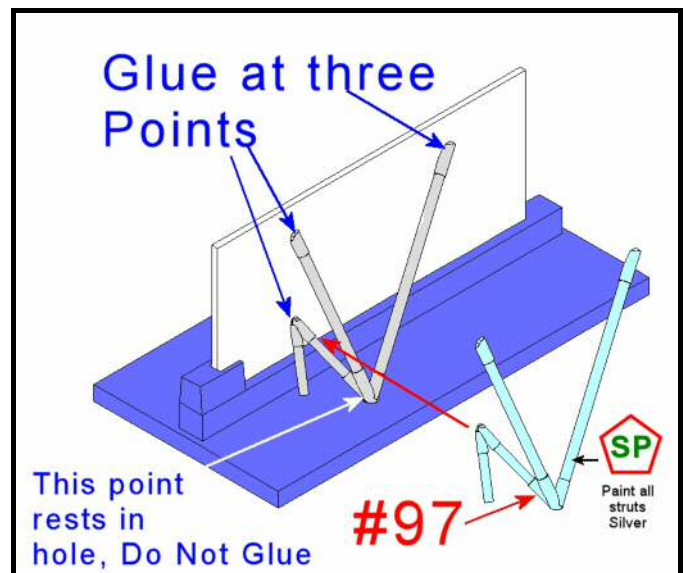
Turn the Tool 6 around and glue Part number 97 into place as shown in Figure 144. This side

Option: it is suggested that you place decals "D" and "E", from the Decal Sheet, on the front and back surfaces of the plastic sheet before trying to glue the struts on. If you do, remember to scrape off the decal clear sheet where the struts would glue to the plastic sheet

correct positioning of the struts, as shown in Figure 143. The correct positioning is shown as the green struts.



**Decal Sheet**

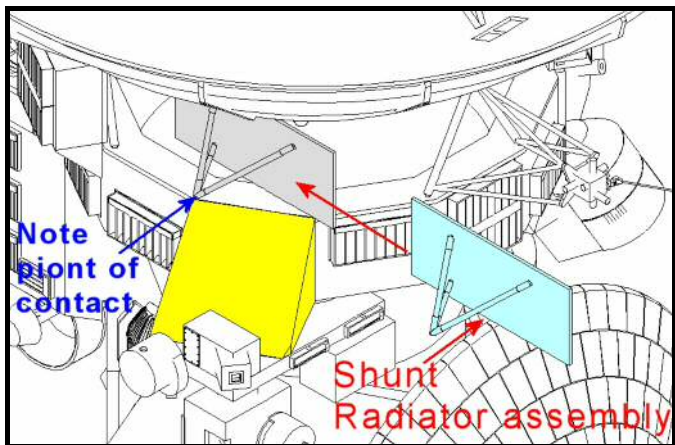


**Figure 144**

also has a small hole for the struts to rest in. Check that they are in the same orientation as shown in Figure 143. Once the glue is dry, remove Tool 6 from the assembly.

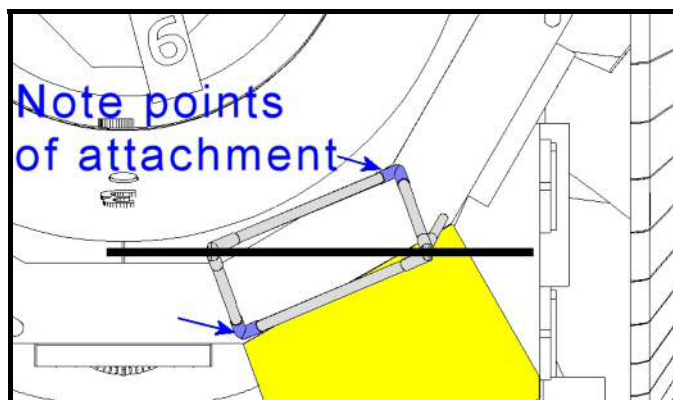
### **STEP# 133**

Mount the Shunt radiator, from Step 132 to the top surface of the bus as in figure 145. Note the mounting structure of the Fields Pallet (noted in Yellow) for the



**Figure 145**

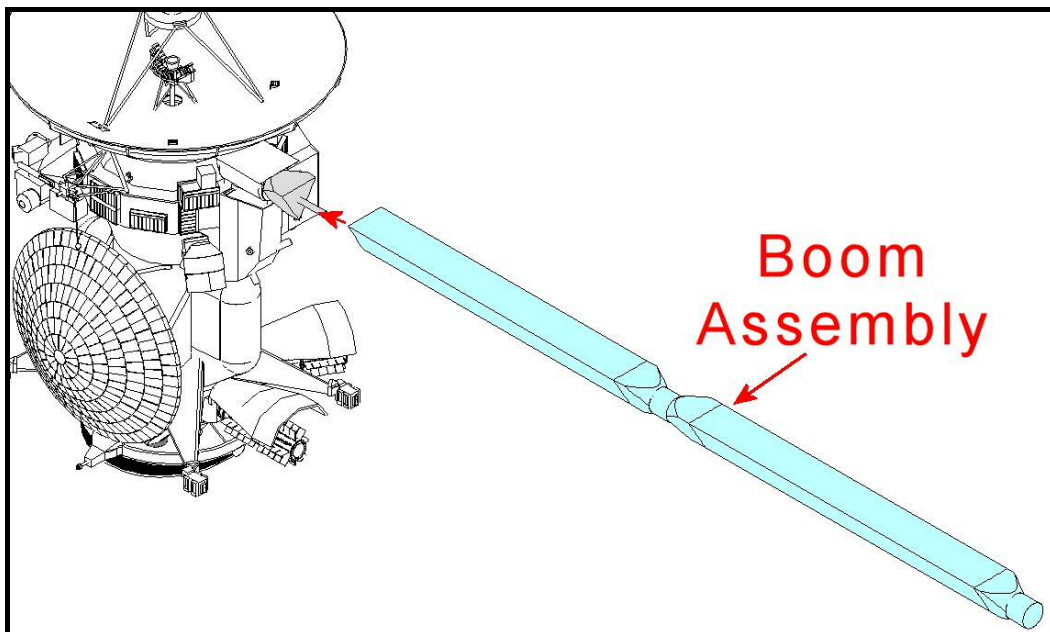
correct location. For proper orientation of the Shunt radiator, see Figure 146. Note the mounting structure of the Fields pallet (noted in Yellow). When mounted in place the top surface of the radiator should be parallel with the surface of the bus.



**Figure 146**

### **STEP# 134**

Find the boom assembly made in Step 35 and glue it into place as shown in Figure 147.



**Figure 147**

## STEP# 135

Just below the magnetometer boom, there are three round metal tubes sticking out of part number 53. Each of these should have a clean hole in the end of them. If not use a .047 drill to clean the tubes out. This will provide a strong mounting for the three RPWS wire antennas. Find the three .047 inch music wire and glue them into the three holes in the studs as shown in Figure 148.

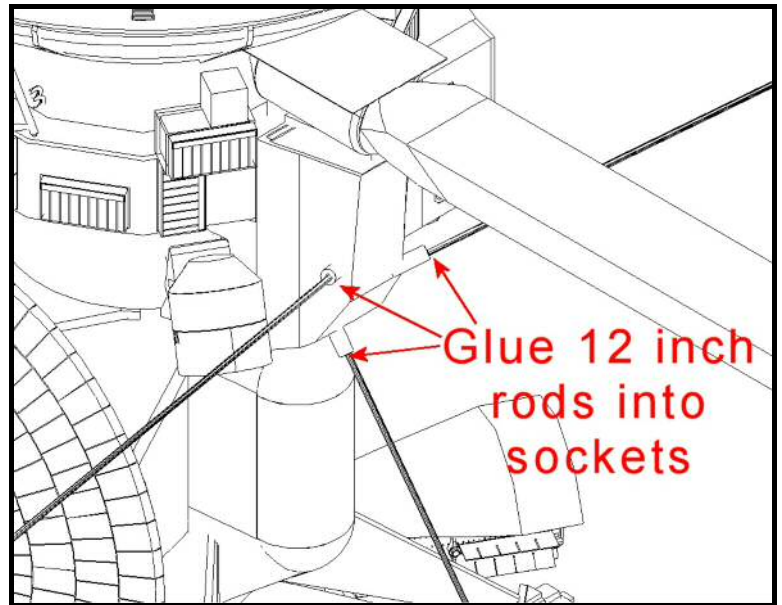


Figure 148

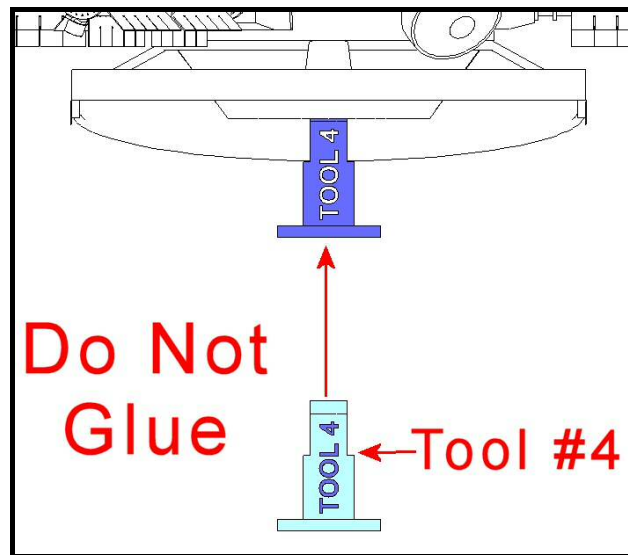


Figure 149

## STEP# 136

Find Tool 4 and mount it in the hole in the bottom of the spacecraft as in Figure 149 (**DO NOT GLUE**). This tool will hold the main engine bells at

the

proper angle, and separation. Find both engine assemblies and glue them in place as shown in Figure 150. Once the glue has dried, remove Tool 4.

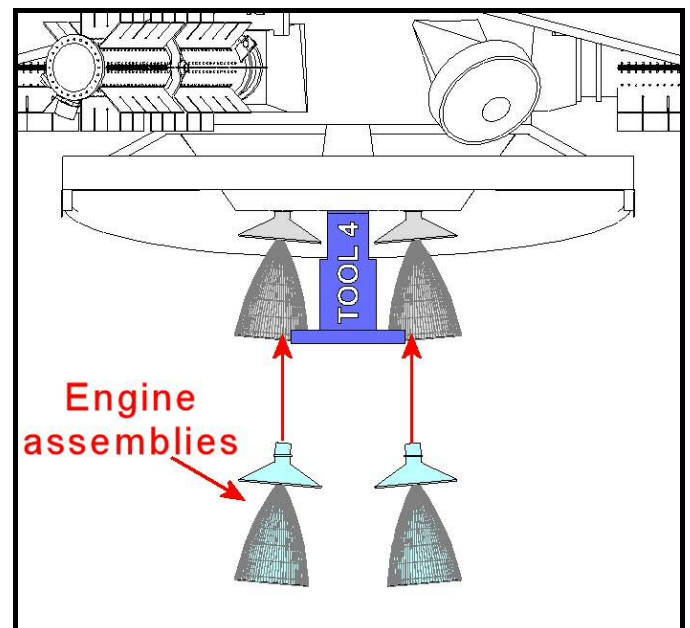


Figure 150

## HOW TO USE THESE DECALS

from Jbot Decal website <http://www.jbot.ca/application.shtml>

These decals are printed on TANGO PAPA decal paper; sometimes the film is very thin. My artwork has been clear-coated to protect the art and to make the decal a bit thicker. I strongly recommend that you clear-coat them again, and even then, be careful when handling them.

Use an airbrush and spray the decals while still on the backing paper with TAMIYA or GUNZE SANGYO clear gloss acrylic paint. **WARNING: Enamel or lacquer based products will likely damage the art.**

The decals are printed on clear film which covers the whole sheet of paper. Using a hobby knife, press softly and cut the film, all around the art, as close to the art as you want. You don't have to cut all the way through the paper; just press enough to cut through the film on the paper. This is called "scoring".

Now, using scissors, cut the individual pieces apart from each other. Cut between your scored lines. The shearing force of the scissors can cause cracking in the art or in the film which is why scoring is important. Scoring also eliminates the excess film from around the art.

Hold the piece of decal paper with tweezers and submerge it for only a few seconds in a bowl of lukewarm water. Really, 5 to 10 seconds is enough. Then pull the decal out and let it sit on your work area for 10 to 20 seconds. If the paper curls do NOT try to flatten it. Let the paper straighten on its own. Rushing it will cause the film (and the art) to shatter. Remove any excess film from around the decal with tweezers.

Wet the surface of the model with water from the bowl. **NOTE; We**

**do not recommend setting solutions;** You can use a setting solution if you want. Some solutions are very strong; they can attack the paint and the decal. Remember, these decals are very thin so they should settle down onto practically any surface. Keep the surface of the model wet.

Place the decal and the paper on the model close to where you want the decal positioned. Using a brush or sponge or cotton swab, slide or push the decal off the paper onto the model. Remove the paper. If you try to lift, peel, or pull the decal off the paper it could curl or tear.

Keep the surface of the model wet. Slide the decal around until it is positioned where you want it.

I know this next step breaks all the rules of decal application but I do it and it works for me: Gently rock or roll a piece of foam / dense sponge across the decal. This soaks up the excess water and helps push the decal onto the surface, squeezing out any bubbles.

Let the decal dry. Don't touch it for several hours. After it is completely dry (a day or two) you can airbrush over it to seal it and bond to the paint and to the model.

**While building past test models, Karl made the following observations;**

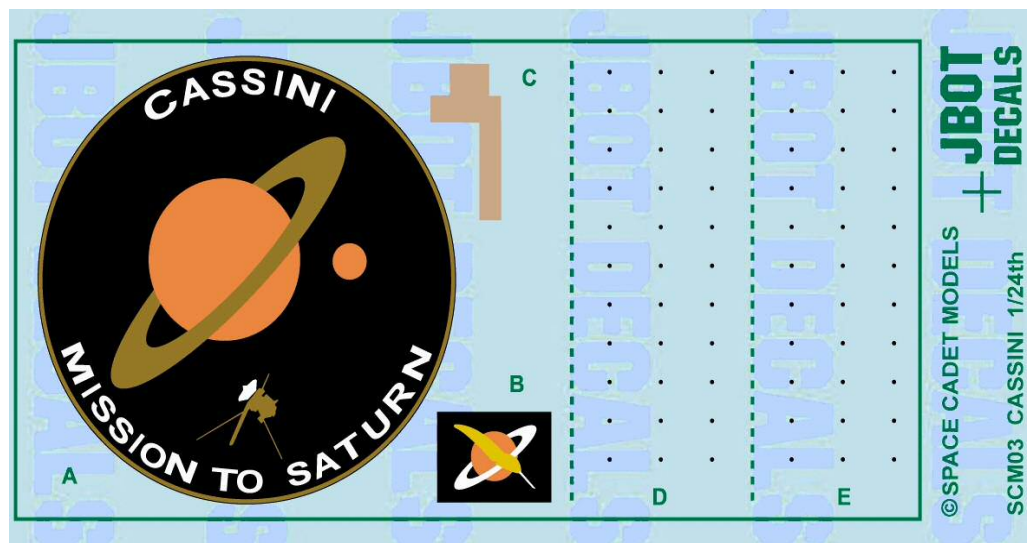
I had really terrible results when I used Microscale decal solvent, so tonight I switched to plain water with some white glue mixed in with it, and it went MUCH better. I also "floated" the decal on the surface with a lot of the water/white glue mix, and tried to minimize how much I handled them. Those few steps seemed to do the trick.

**PLEASE NOTE: as Jbot Decal's instructions say, the paper**

used for the decals is very fine. In order to help preserve the colors, we have coated the decal sheets with liquid acrylic (Future Floor Polish). During application, we observed that decal setting solutions were detrimental to the decals. It is strongly suggested that you do not use decal setting solutions. Instead, use water with a small amount of white (Elmers) glue to prepare the decal. When the decal is ready to be applied, apply a generous amount of this solution to the area where the decal goes (like a puddle) and “float” the decal in the solution. Try to avoid moving the decal around or handling it as much as possible.

## DECAL PLACEMENT

**Decal “A”** is included for those individuals that might want to do an assembly room diorama, as our research indicated that it was only draped over the spacecraft for a press photo shoot after final assembly. Should you want to use it see Figure 153. **Decal “B”** covers the signature disk that flew on the mission, shown in Figure 154. **Decal “C”** are the UVIS instrument windows. All our research pointed to an area in the thermal blankets that had an Ultraviolet permeable covering in the blankets so the instruments were covered but able to do their work. See Figure 155 for location. **Decal “D” and “E”** are the hole patterns the Shunt Radiator see Figure 156 for the placement, one on each side, centered top to bottom and left to right. See Figure 151.



Decal Sheet



Figure 153

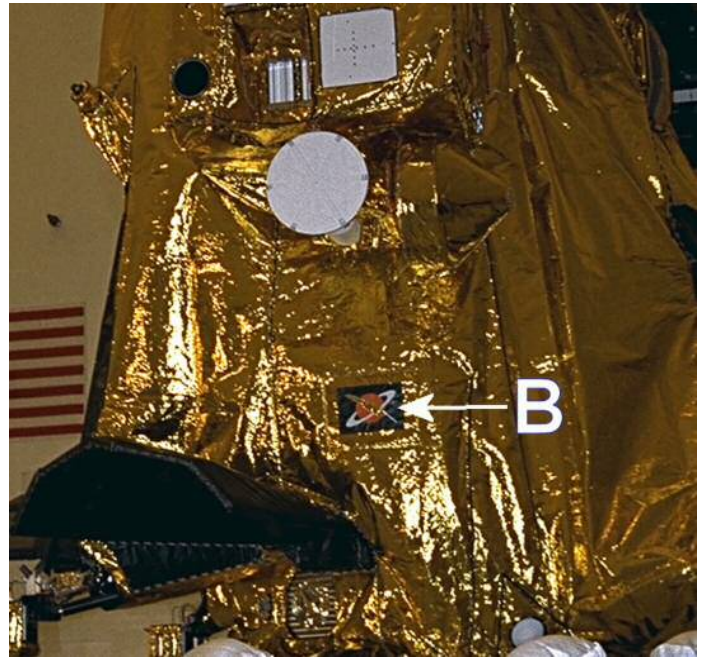


Figure 154

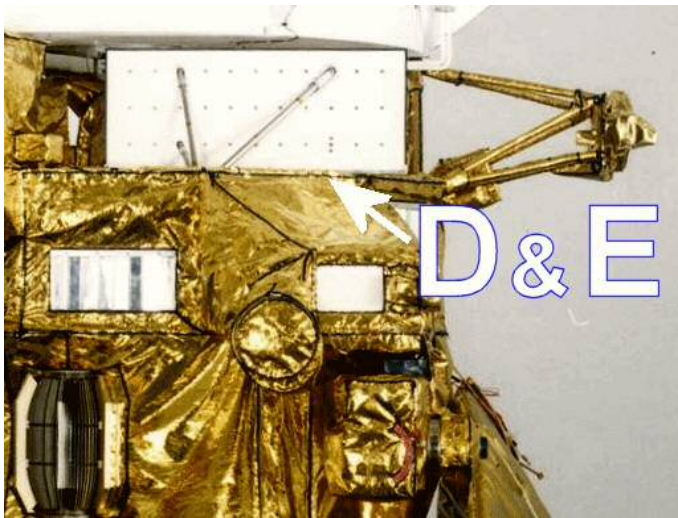


Figure 156



Figure 155

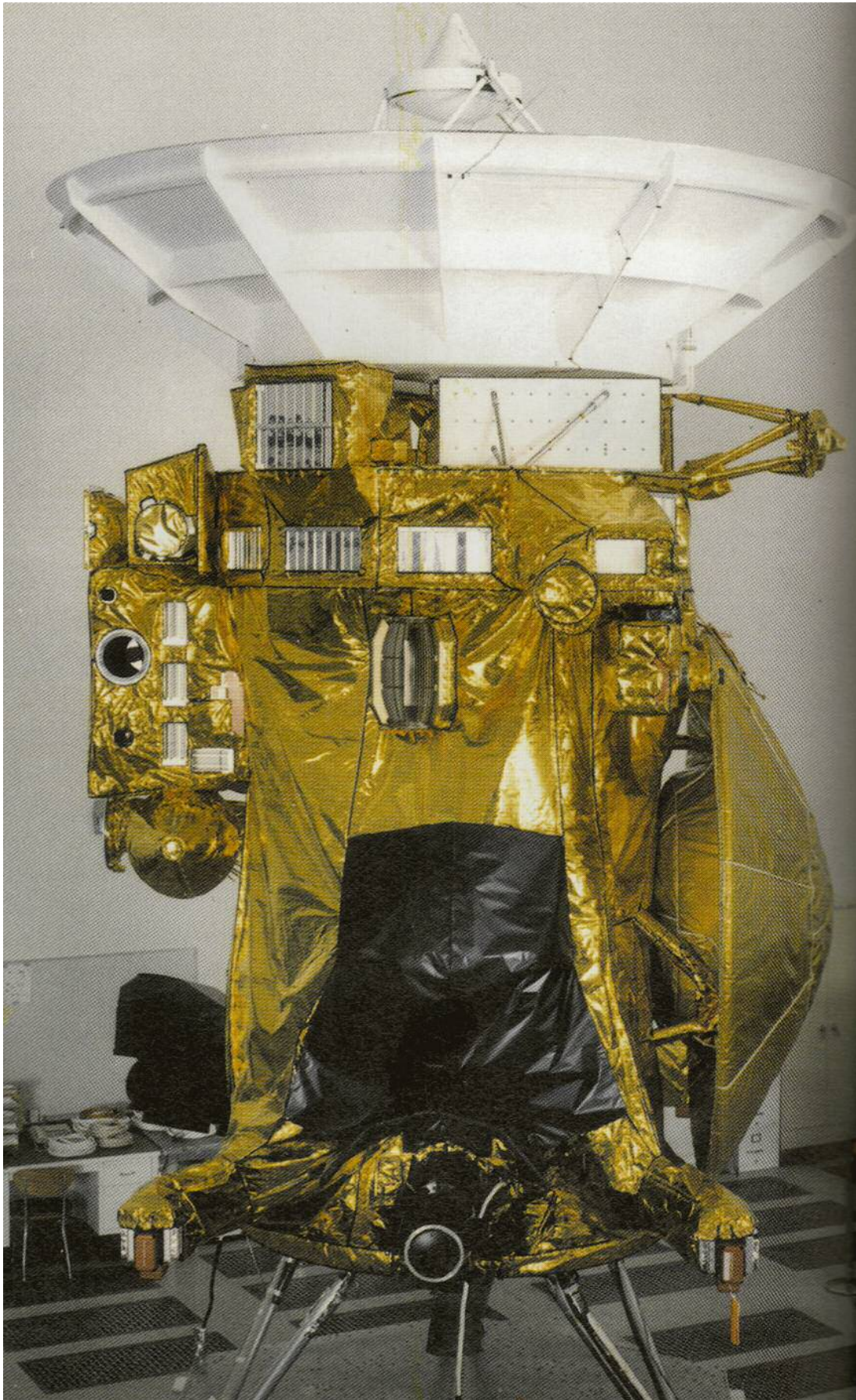


Figure 157

# DISH ANTENNA PREPARATION

Above all: take your time, check your work frequently. Remember that the HGA is the single largest part of the spacecraft that is not covered in gold foil, so it behooves you to get it right.

1. Separate the dish from the base – Using a sharp Xacto knife, lay the vac formed part on a flat surface, rotate it horizontally with the tip of the Xacto knife held against the edge of the dish, where the lip is.
2. Once the HGA is separated from the base, use a pair of sharp scissors to remove most of the remaining lip, but leave a small amount of the lip
3. Mark the remaining lip with a Sharpy, so you know where to stop
4. Use a large piece of fine grit sand paper (I used 220 grit) to sand along the edge to remove excess plastic to make the edge flat, then sand along the inside of the edge to remove any remaining excess plastic.



In Step# 119 try to make sure that the heat shield tiles that are white, as shown in Figure 158, are at 6 o'clock with the 12 o'clock indentation of part #45 in the stated 12 o'clock position. It is also suggested that the gold foil is added before glueing the completed probe, in place, as shown in Step# 120.

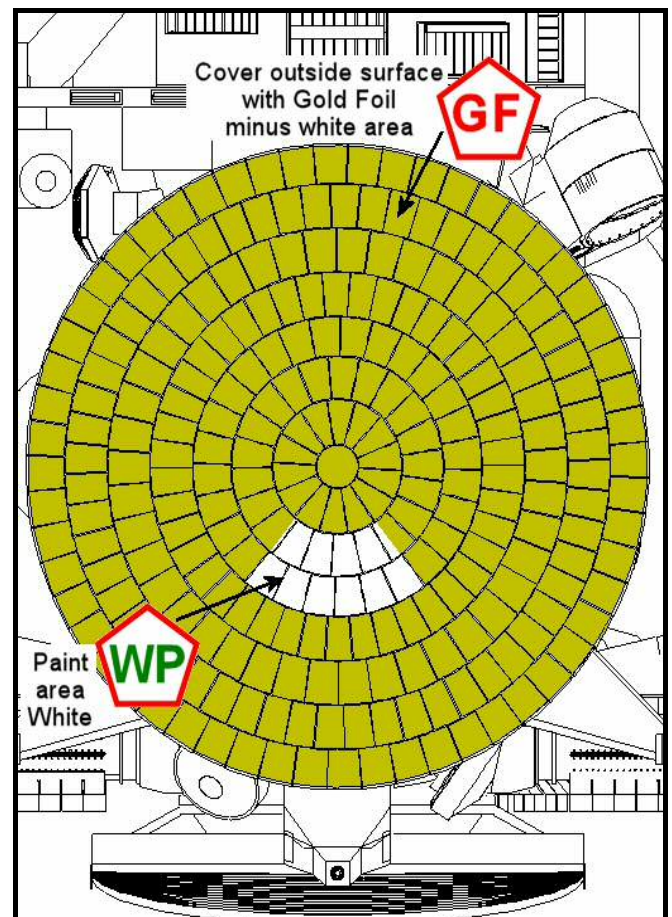


Figure 158

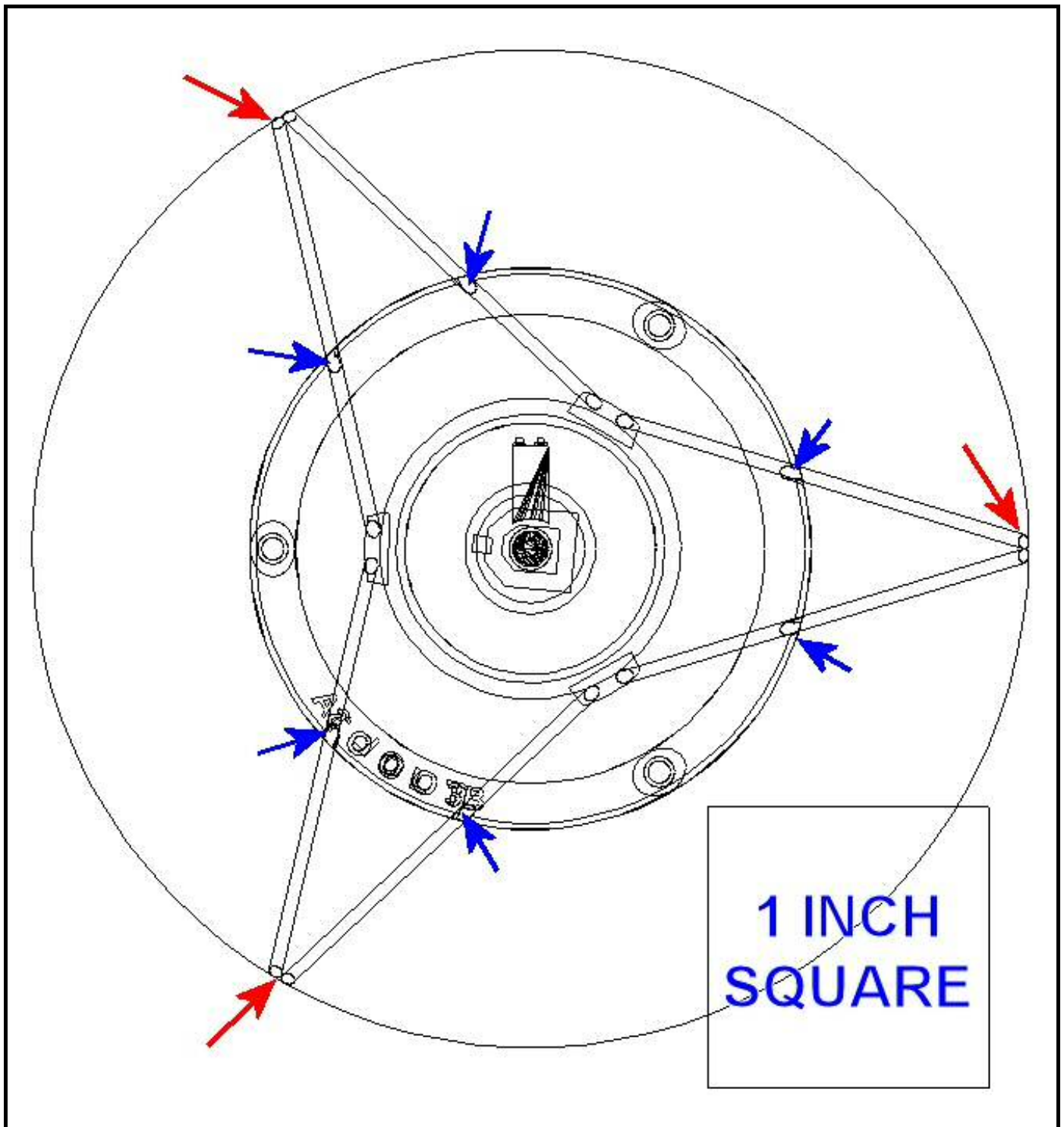
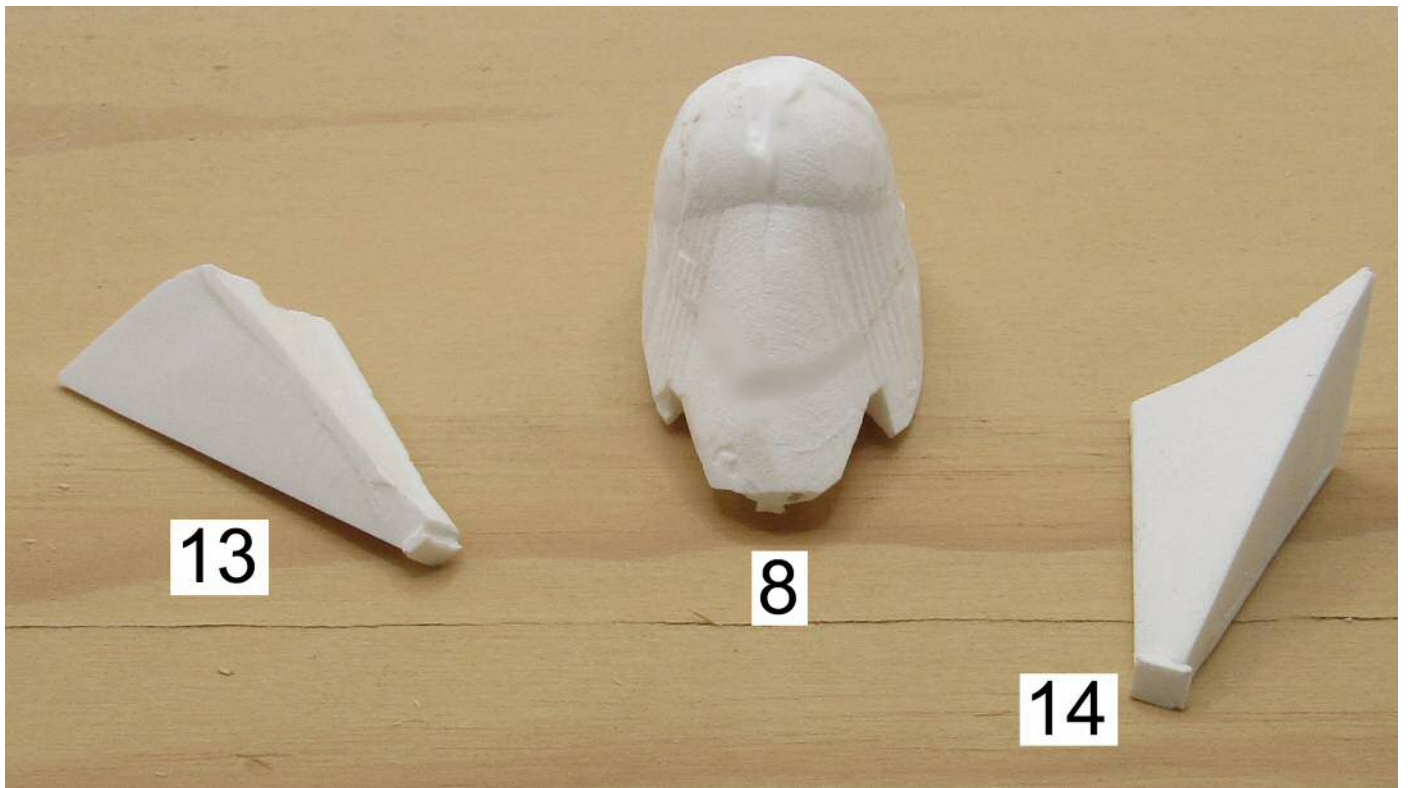
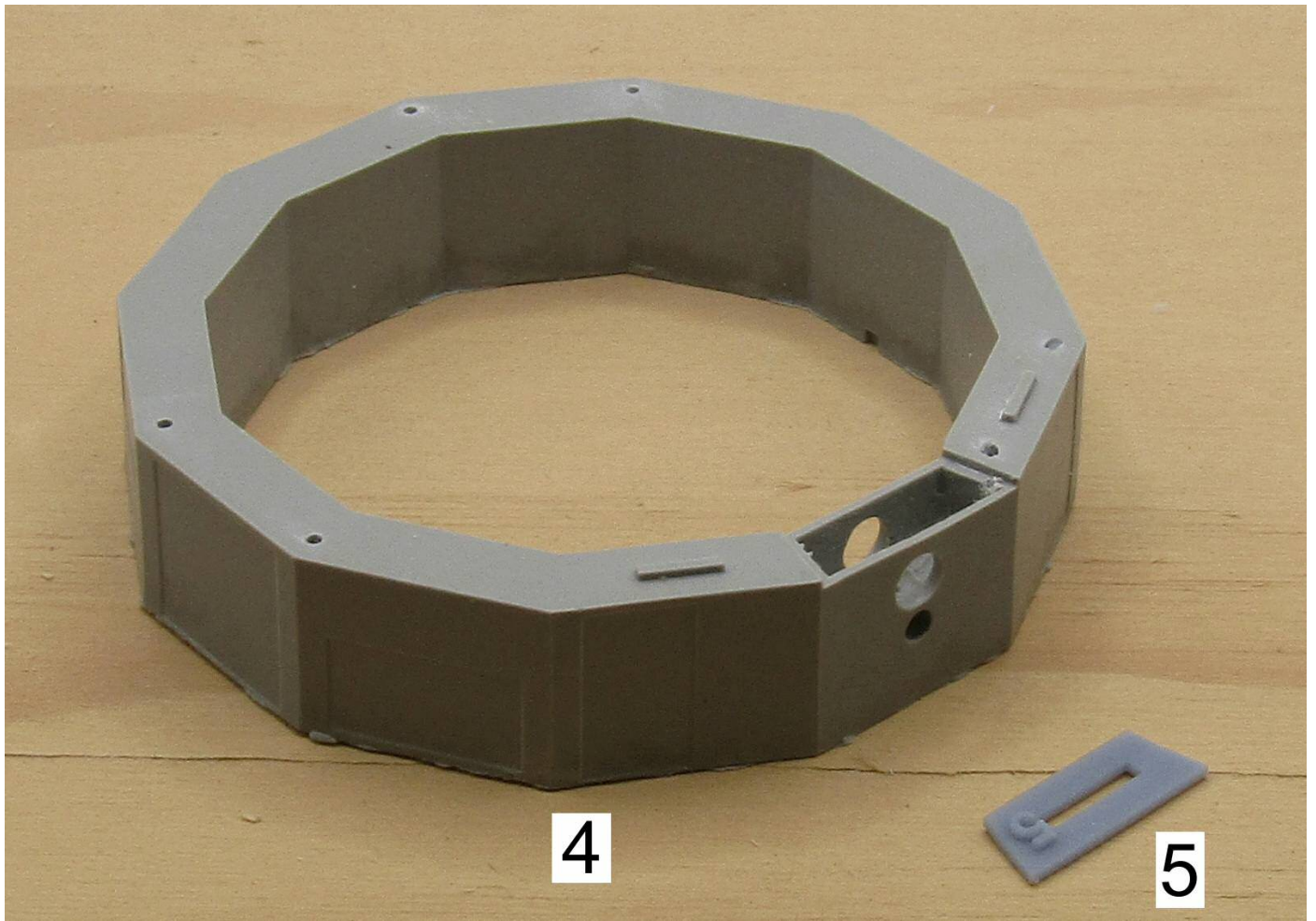


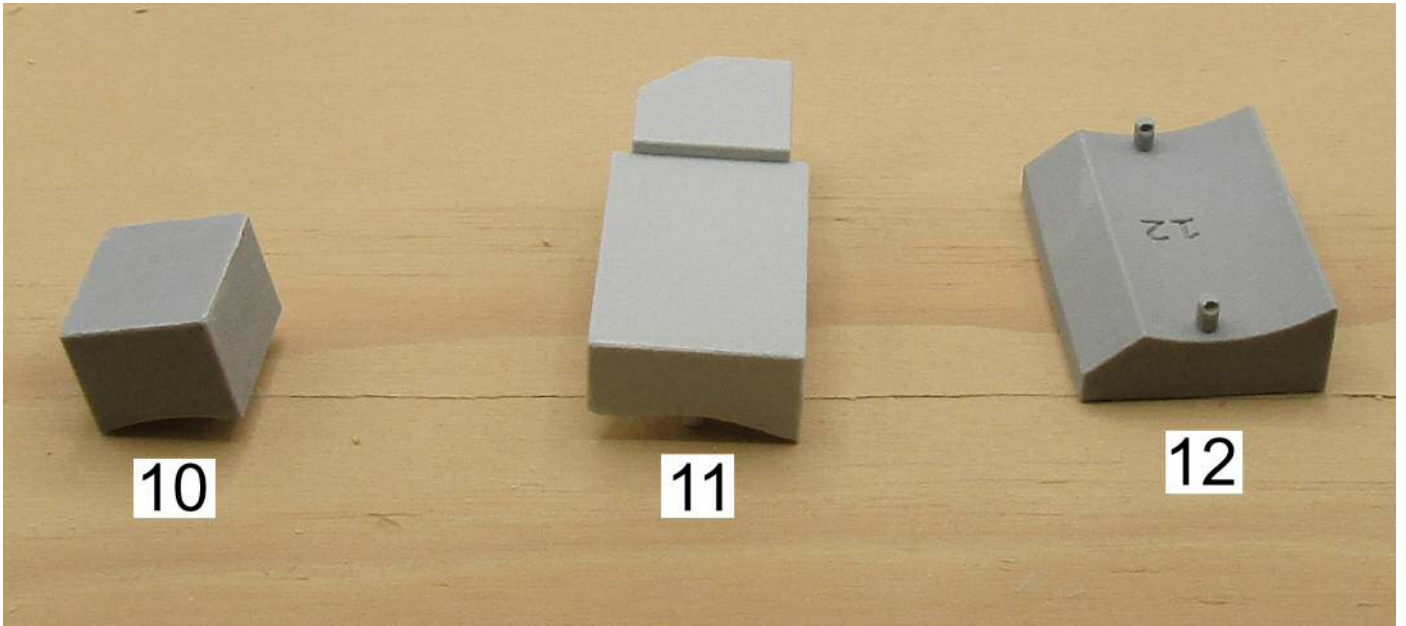
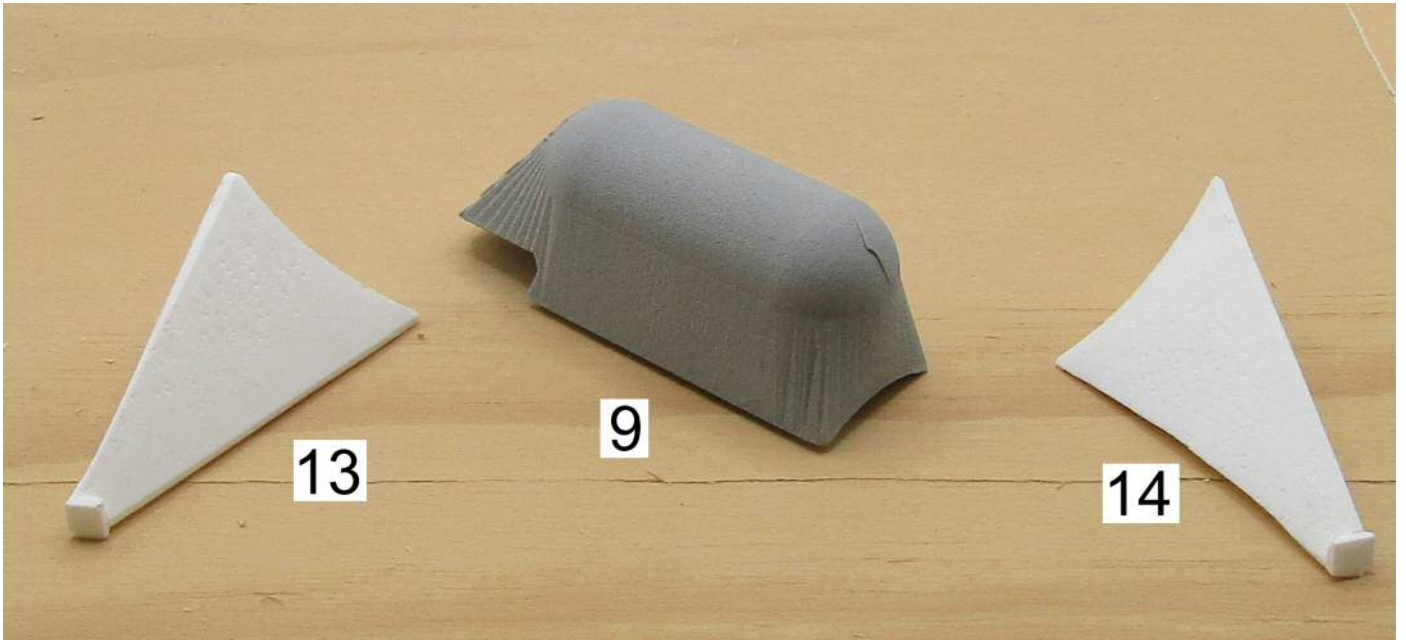
Figure 159

From **Step #96**: place the metal rods so that one end touches where the red arrows are. Lean the rods against the Combined Tool #3a/b, into the indentations shown with blue arrows. You could try tape or a rubber band to hold the rods in place against the Combined Tool #3a/b. During the Alpha build Karl had some

trouble getting tape to stick to the Tool. So we are suggesting using rubber cement to hold the rods in place. When the assembly is glued together, the rubber cement can be rubbed away.







Part #26 was printed with clear plastic, and is hard to see in this image. Refer to step #12 in the instructions



27

These are the main engine bells for the spacecraft.



25



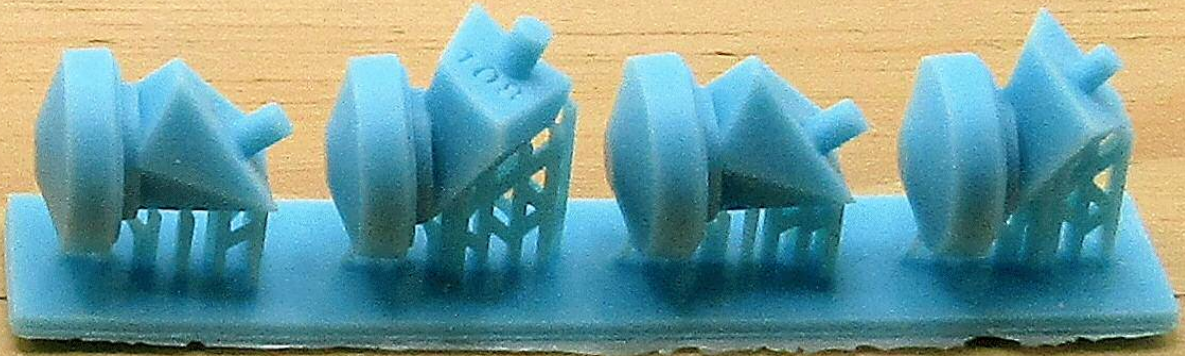
29a



29b



**53**

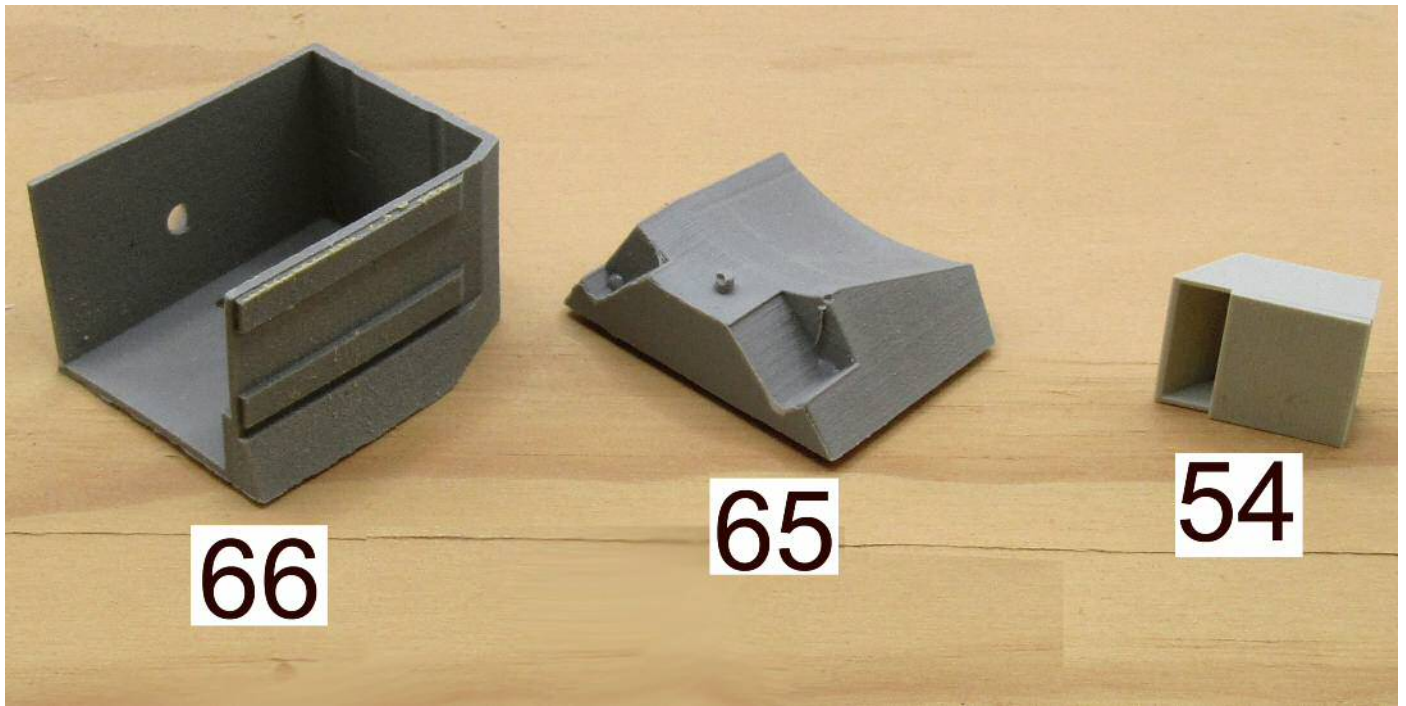


**40**

**108**

**41**

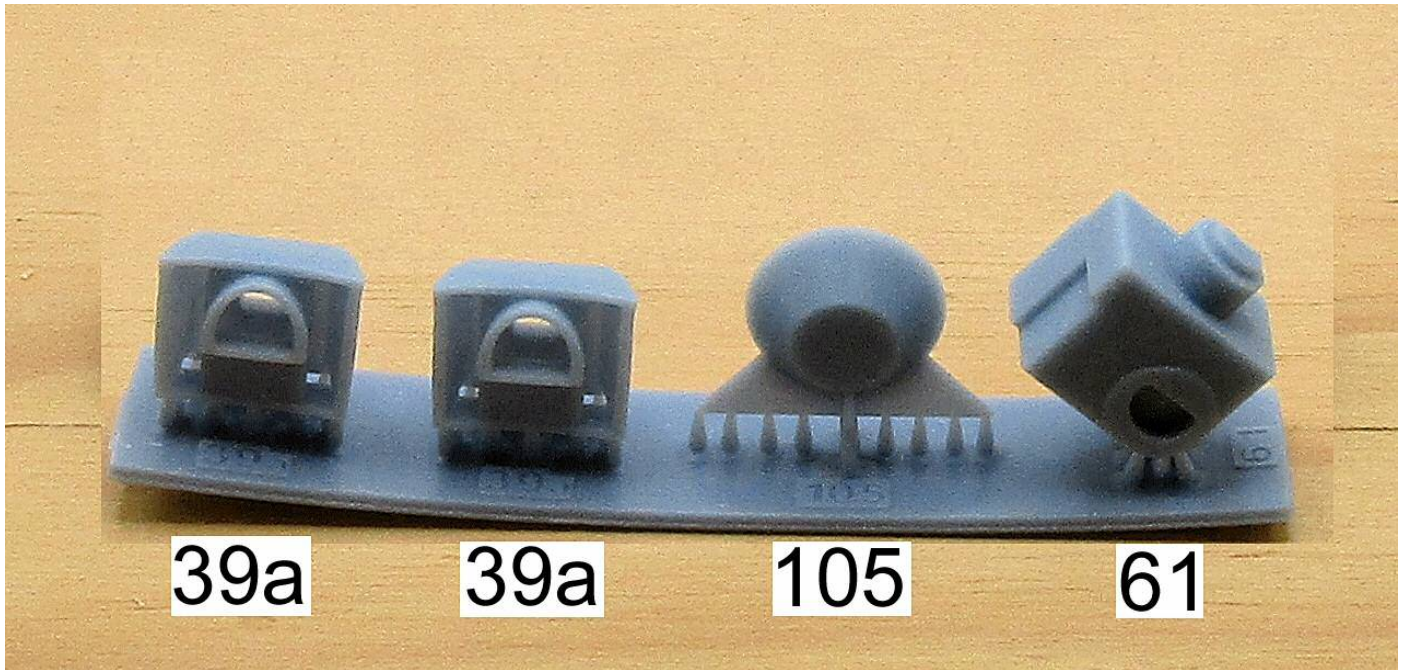
**42**



66

65

54



39a

39a

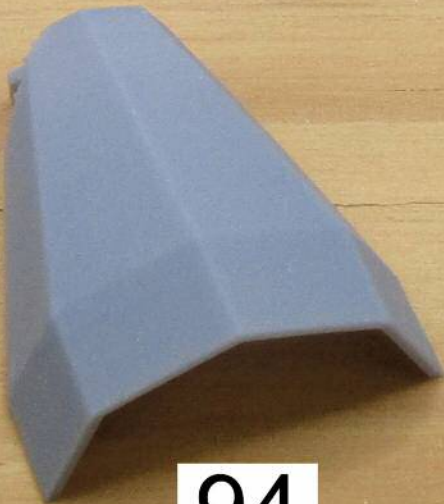
105

61

39a



39b



94



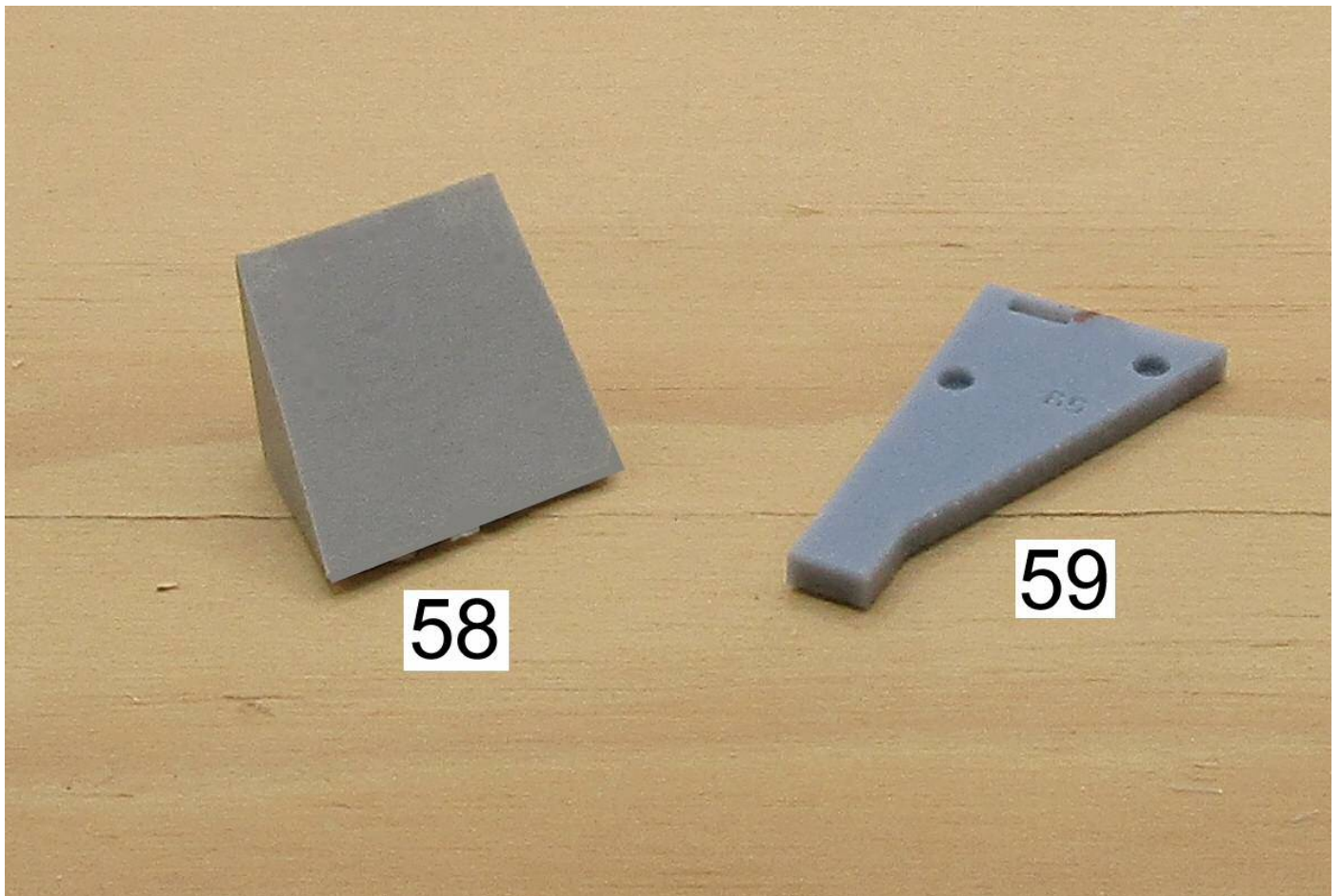
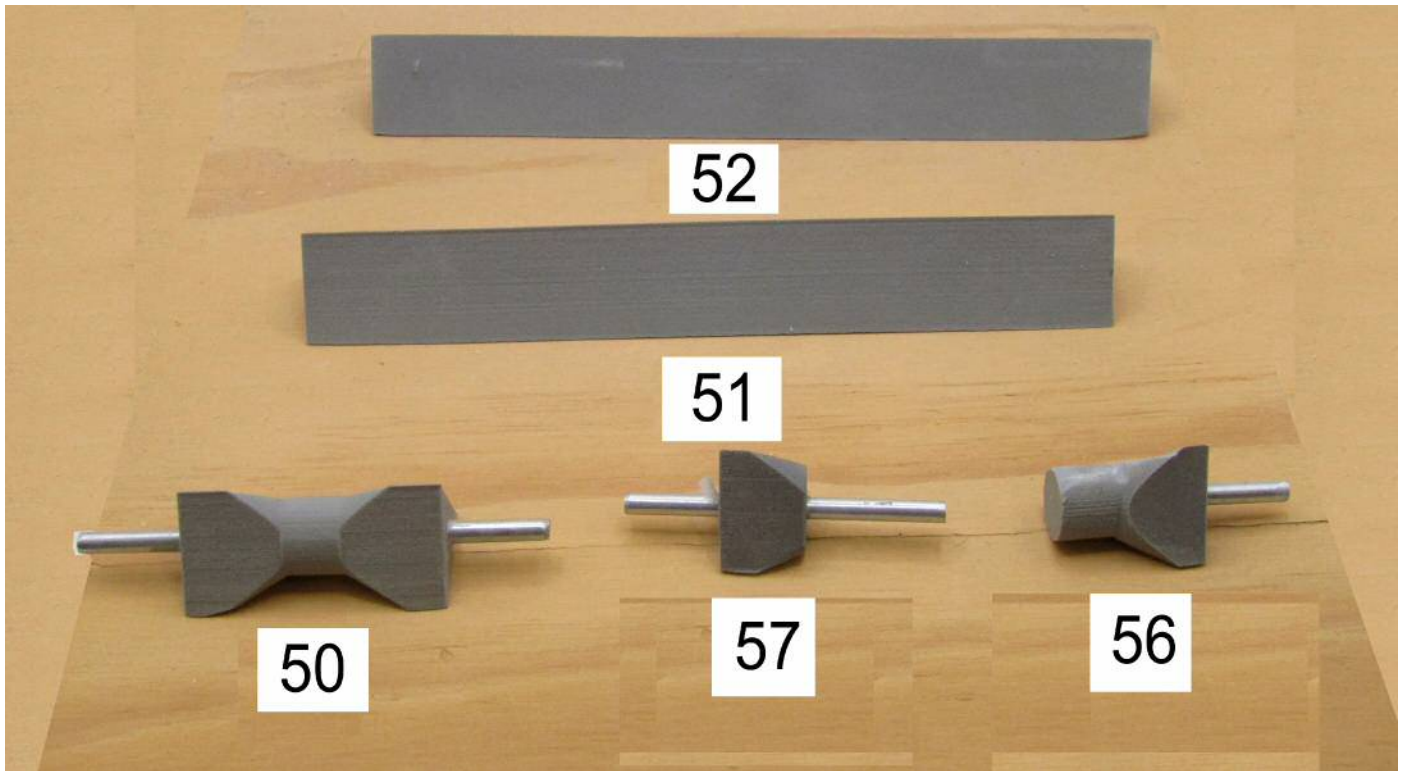
95

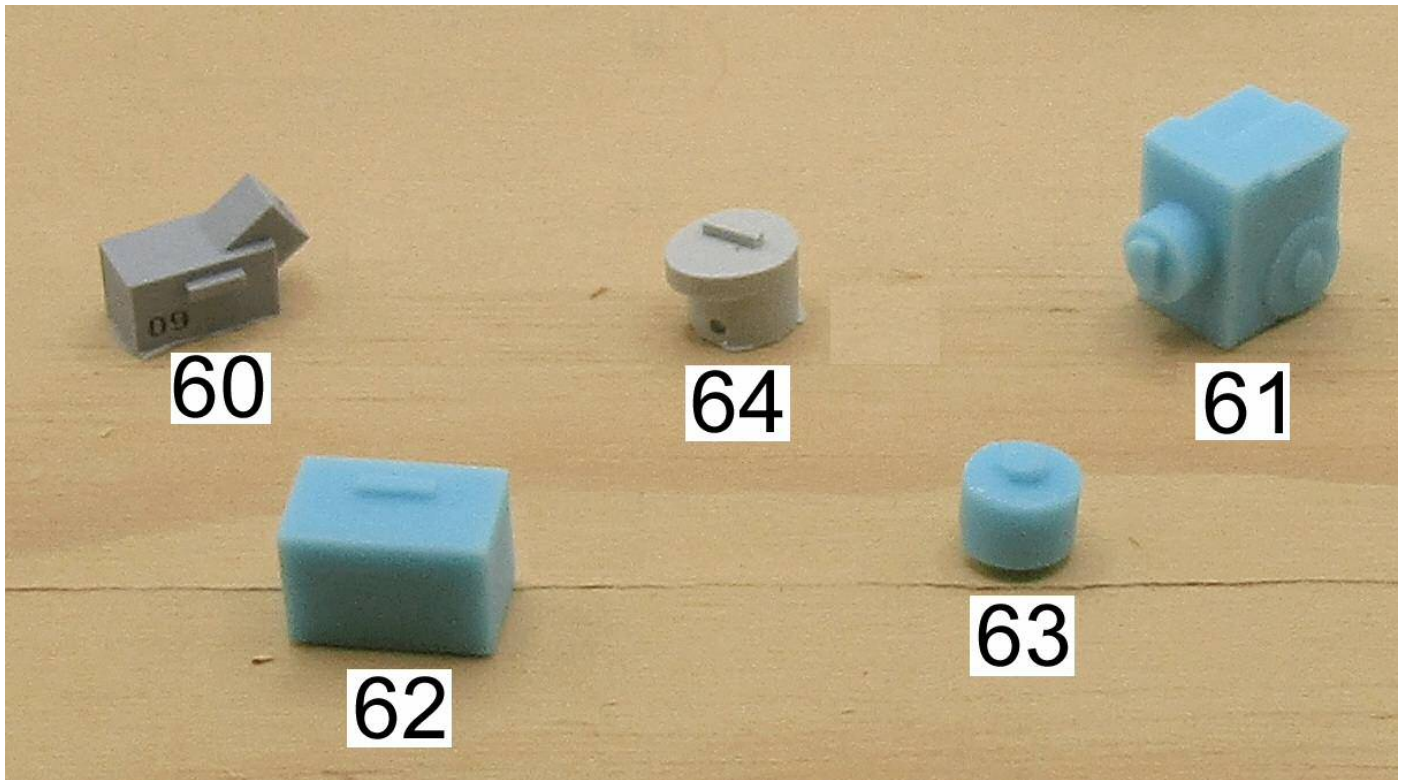


104

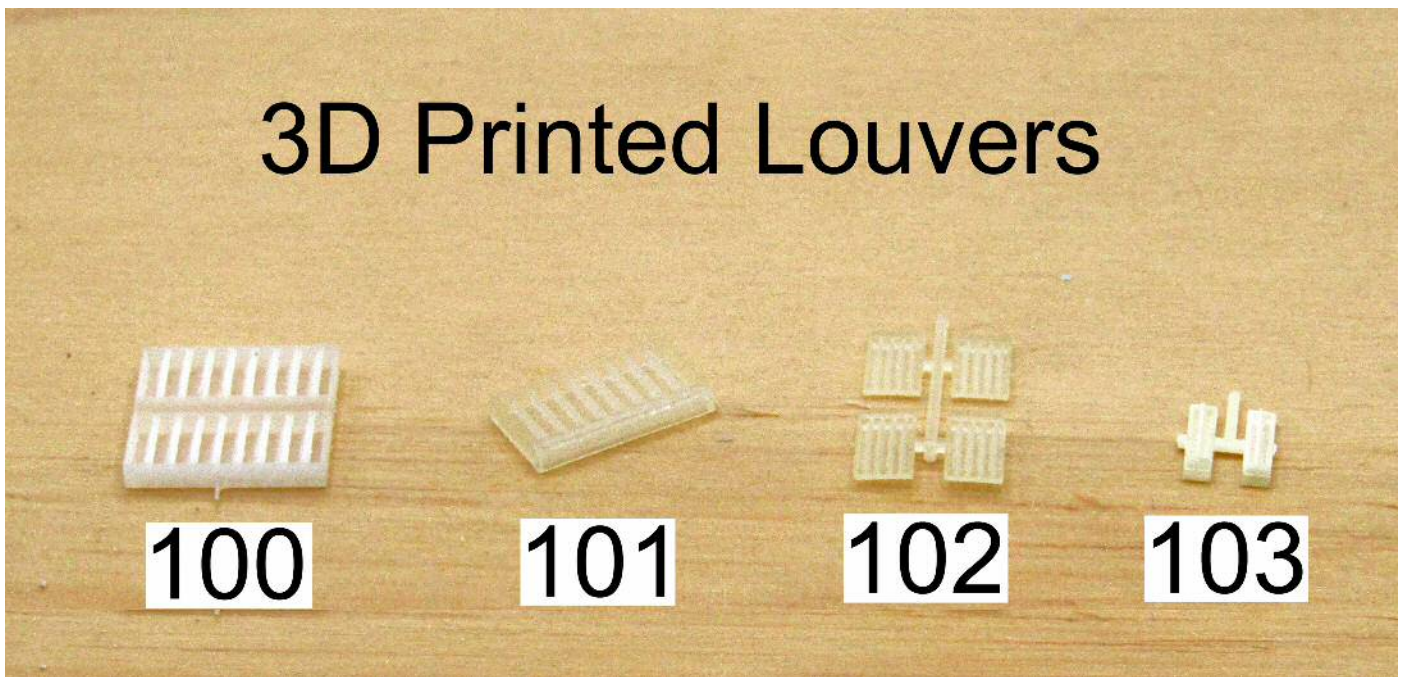


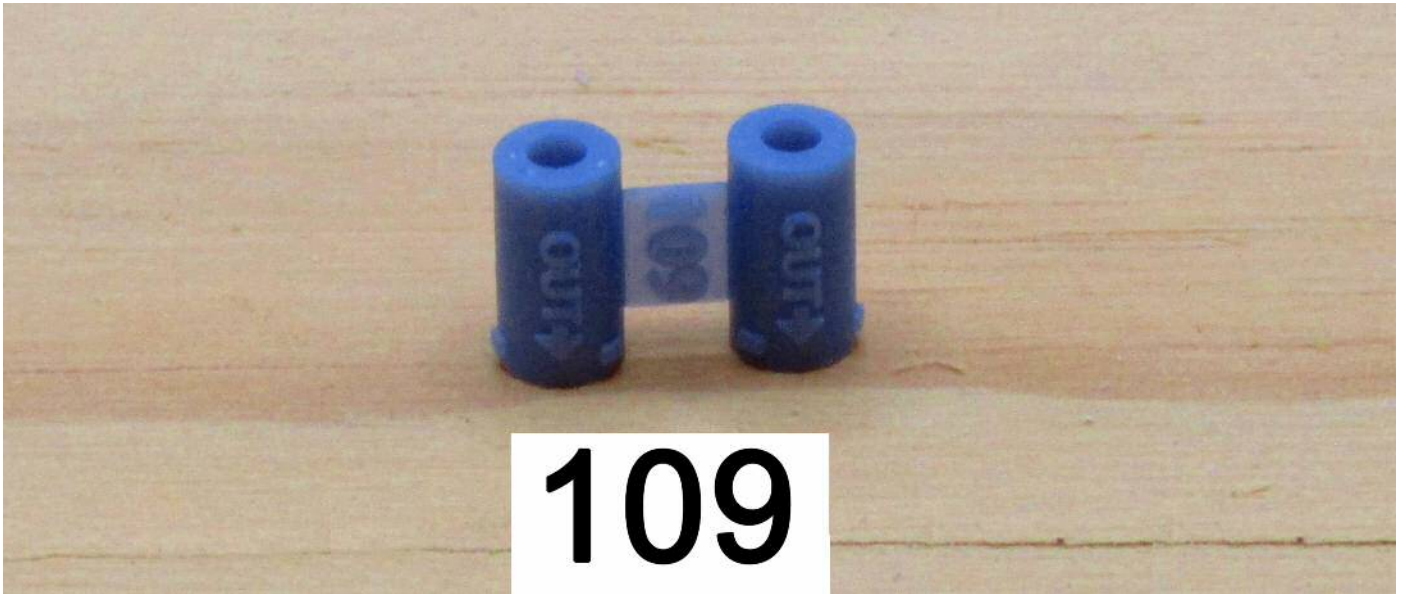
105





## 3D Printed Louvers

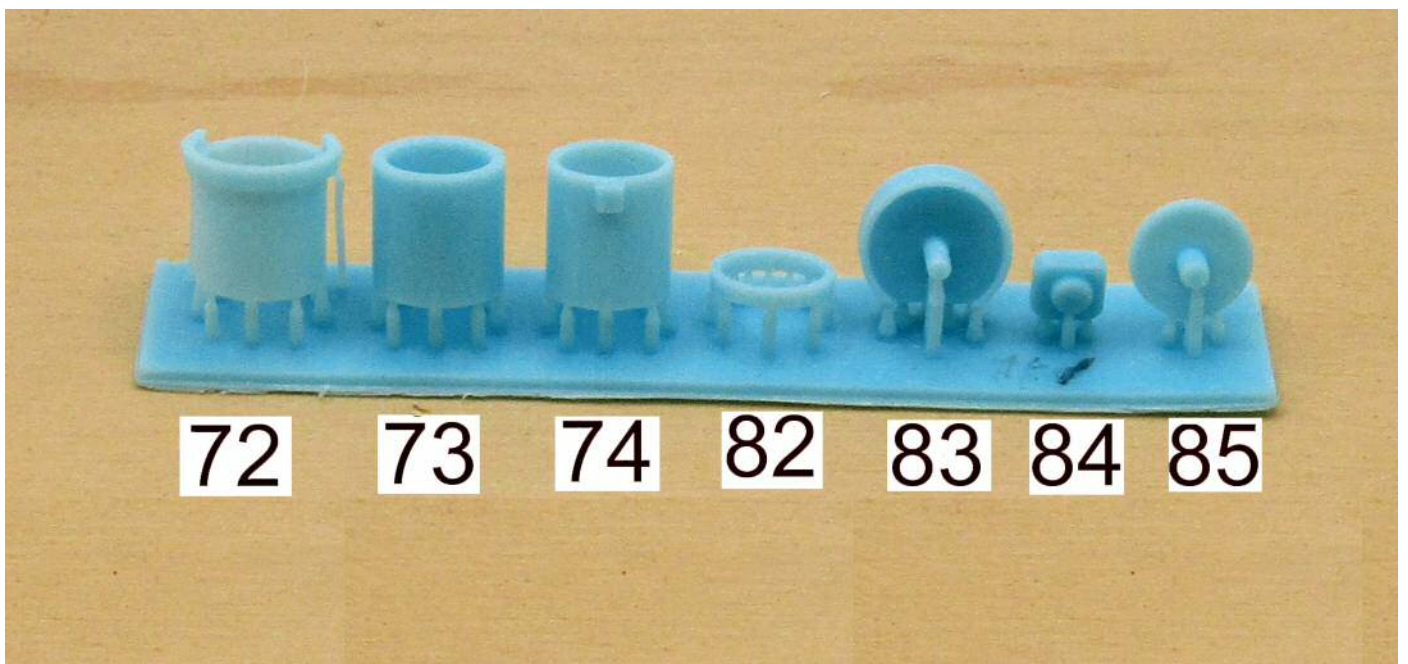
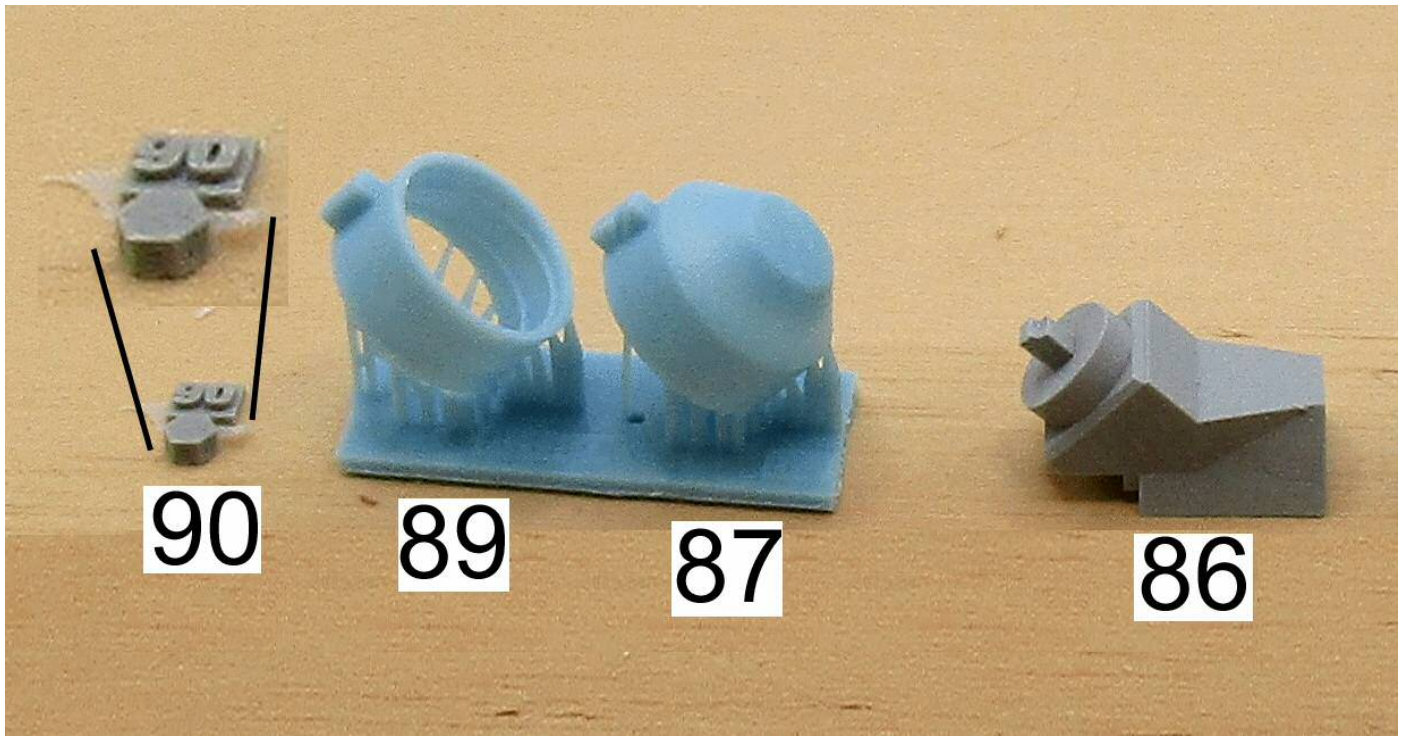


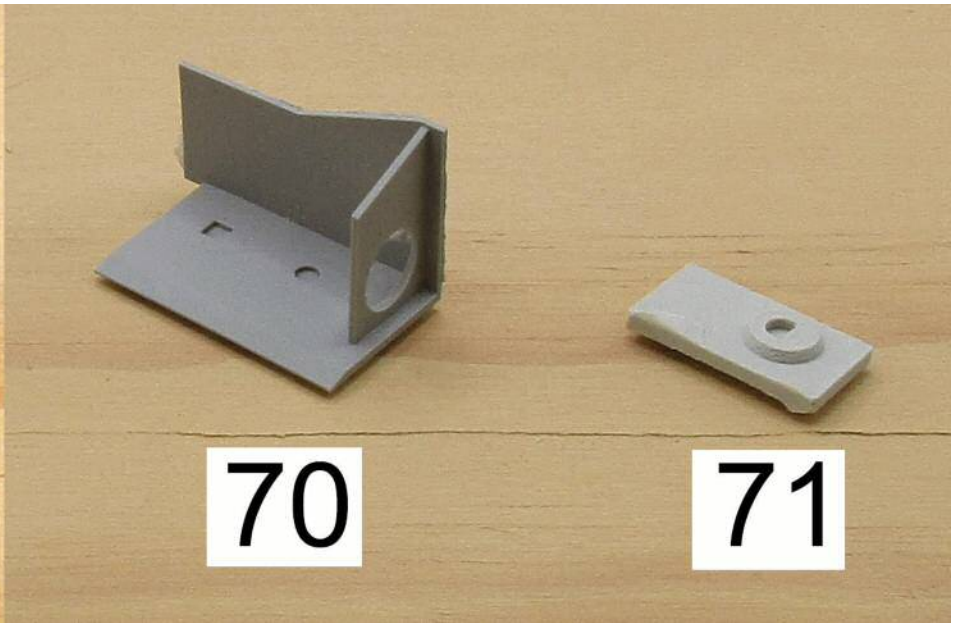
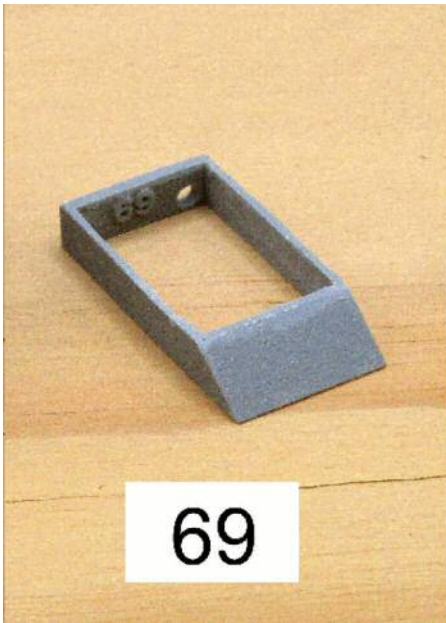
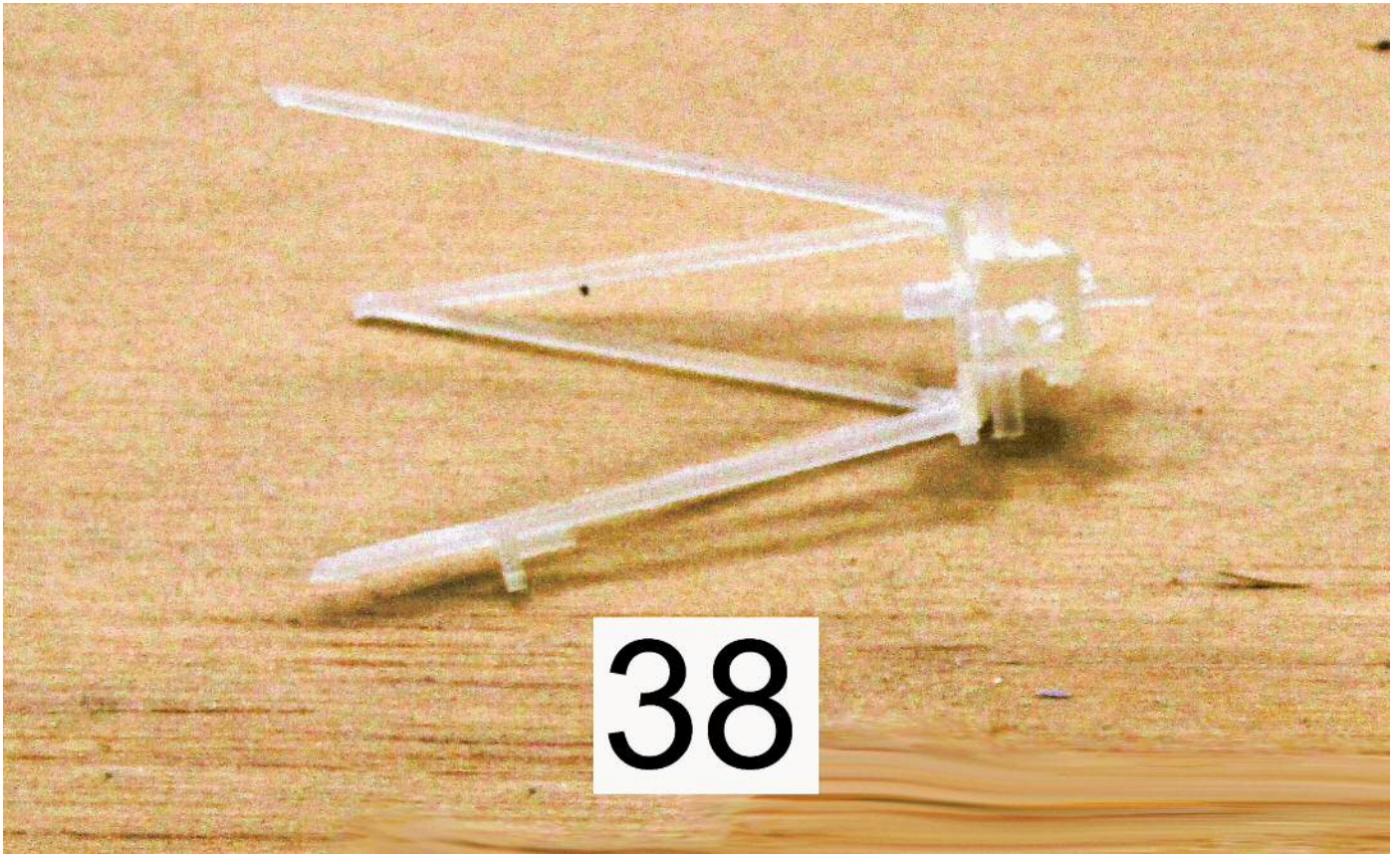


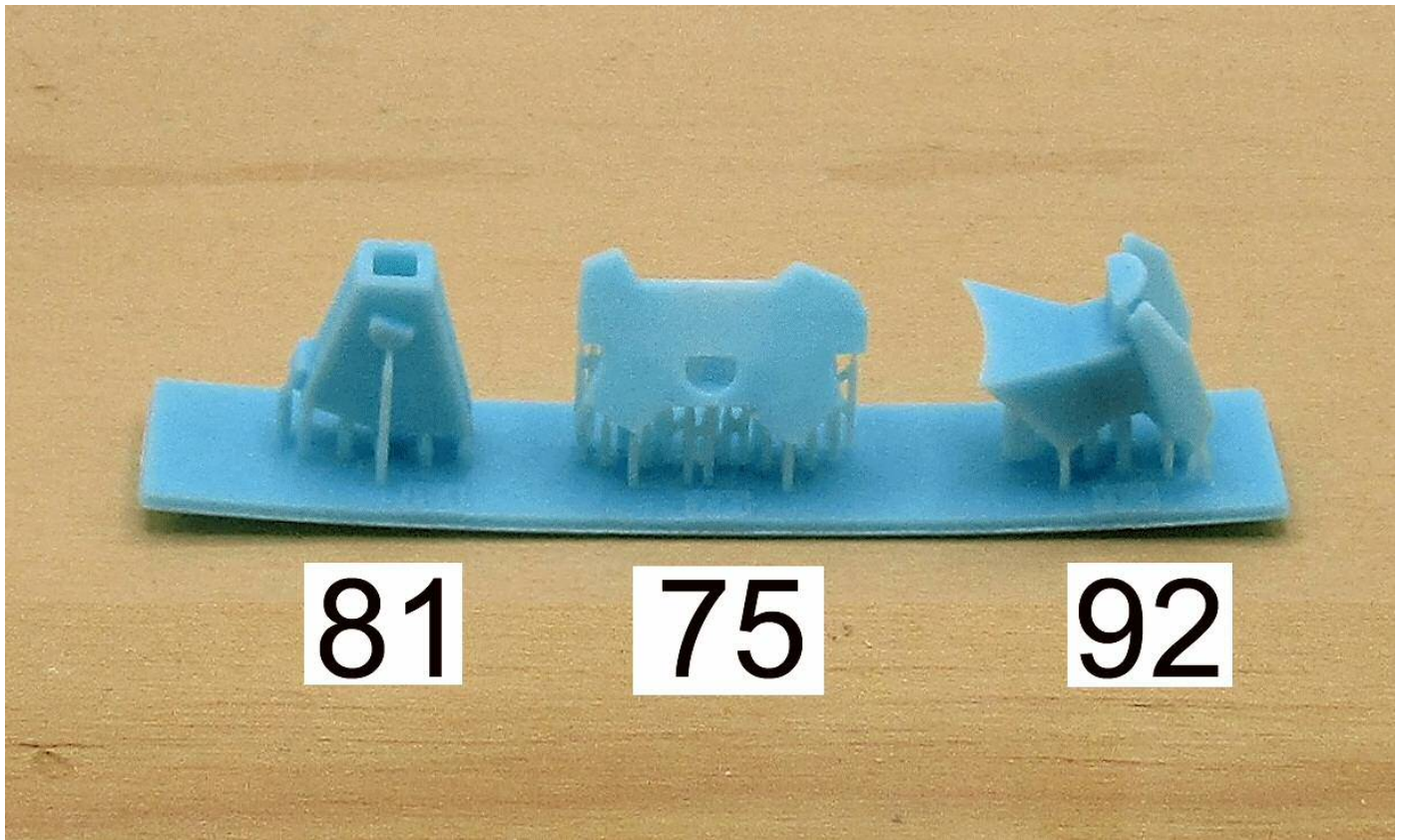
**109**

**Part #46 Huygens  
Heatshield**





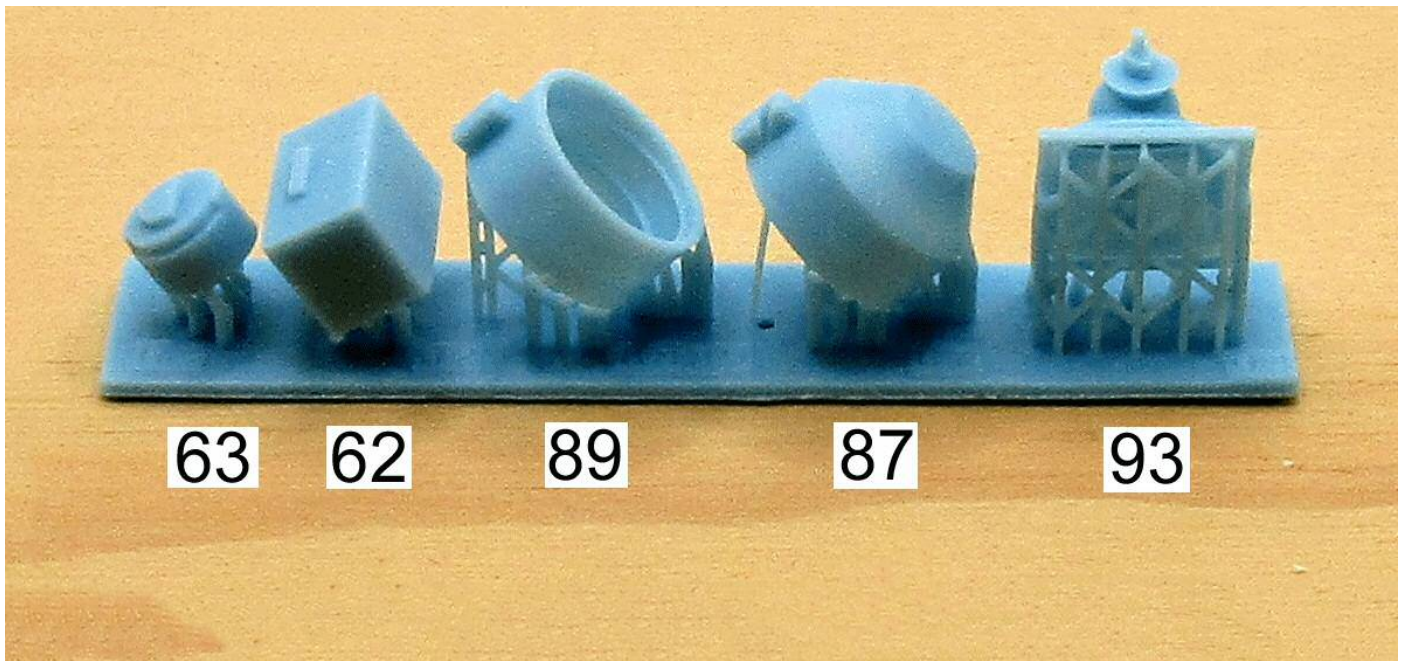




81

75

92



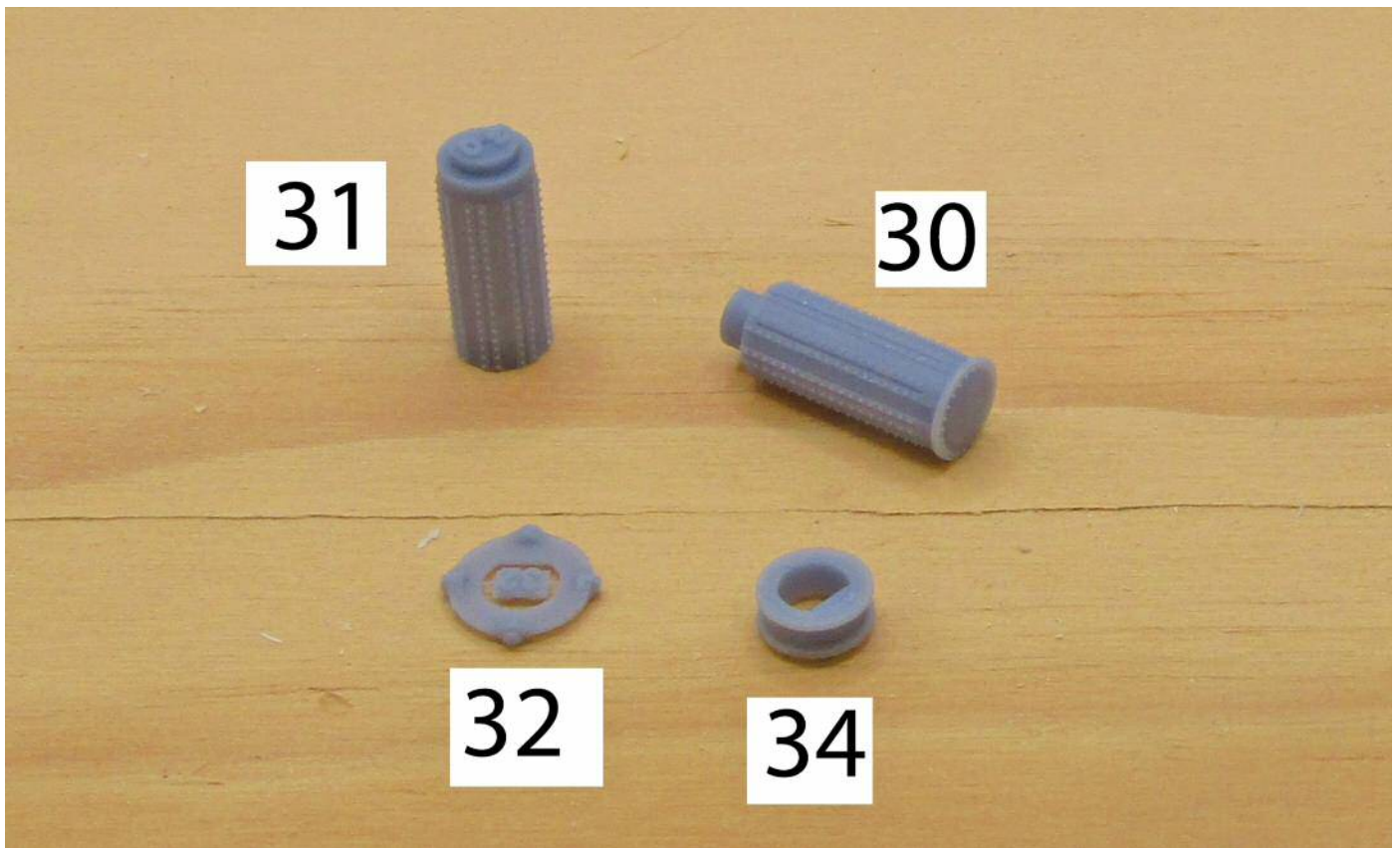
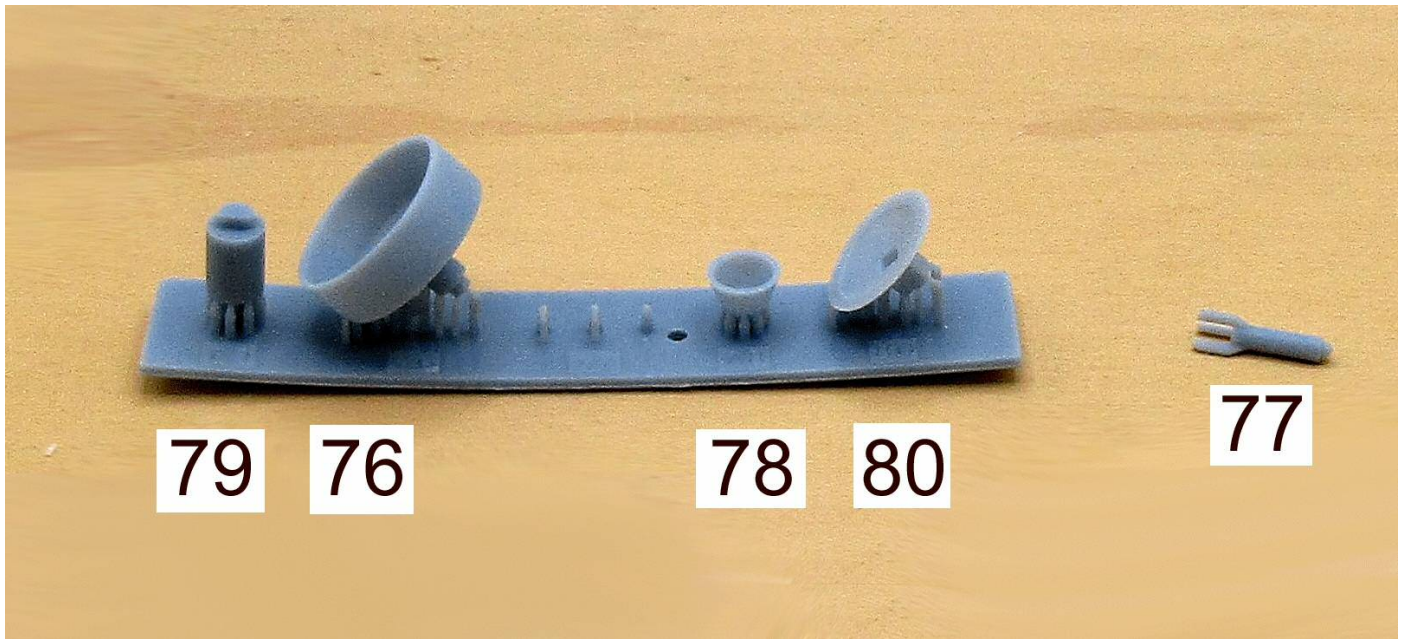
63

62

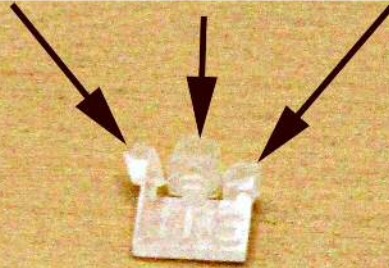
89

87

93

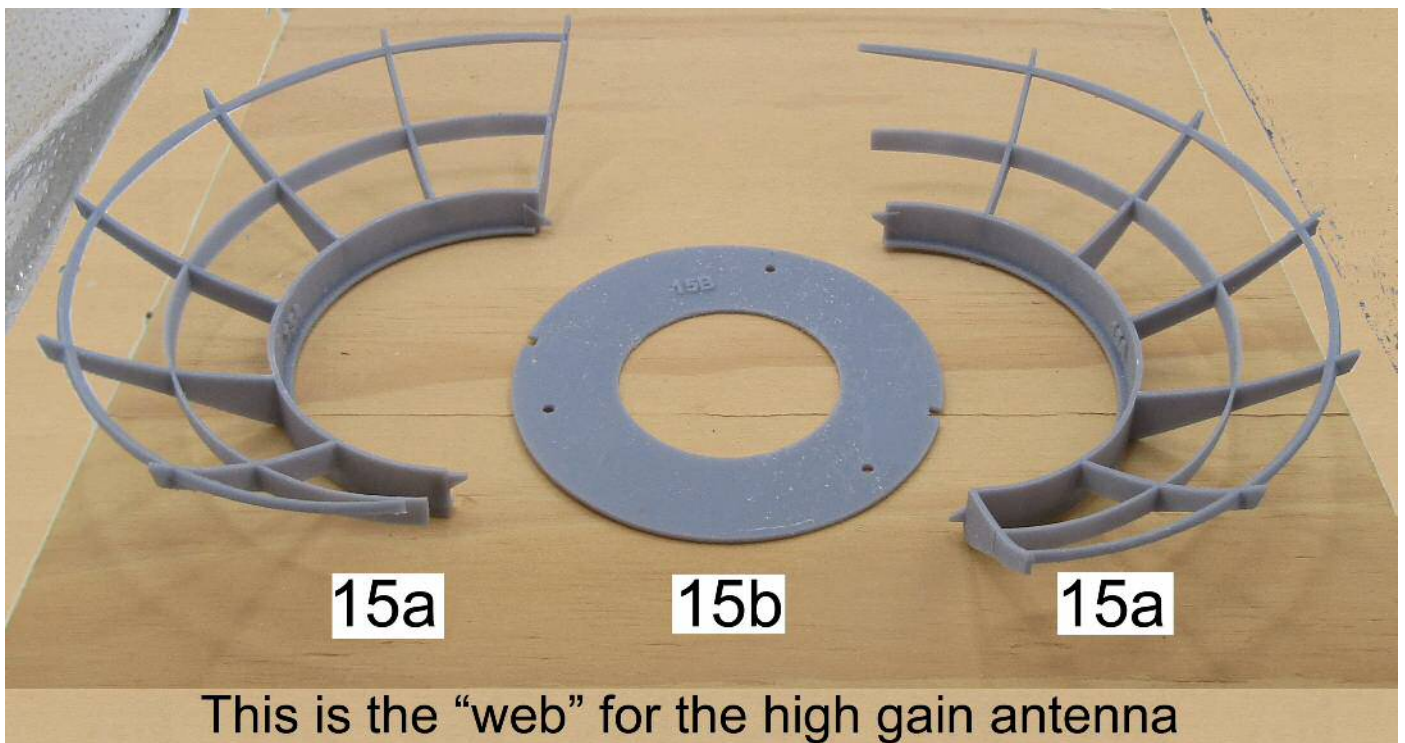


36R 36T 36G



Part #36 is printed in clear plastic and is very small. There are 3 parts that are RTG greeblies. Therefore they are designated as 36R, 36T, and 36G.

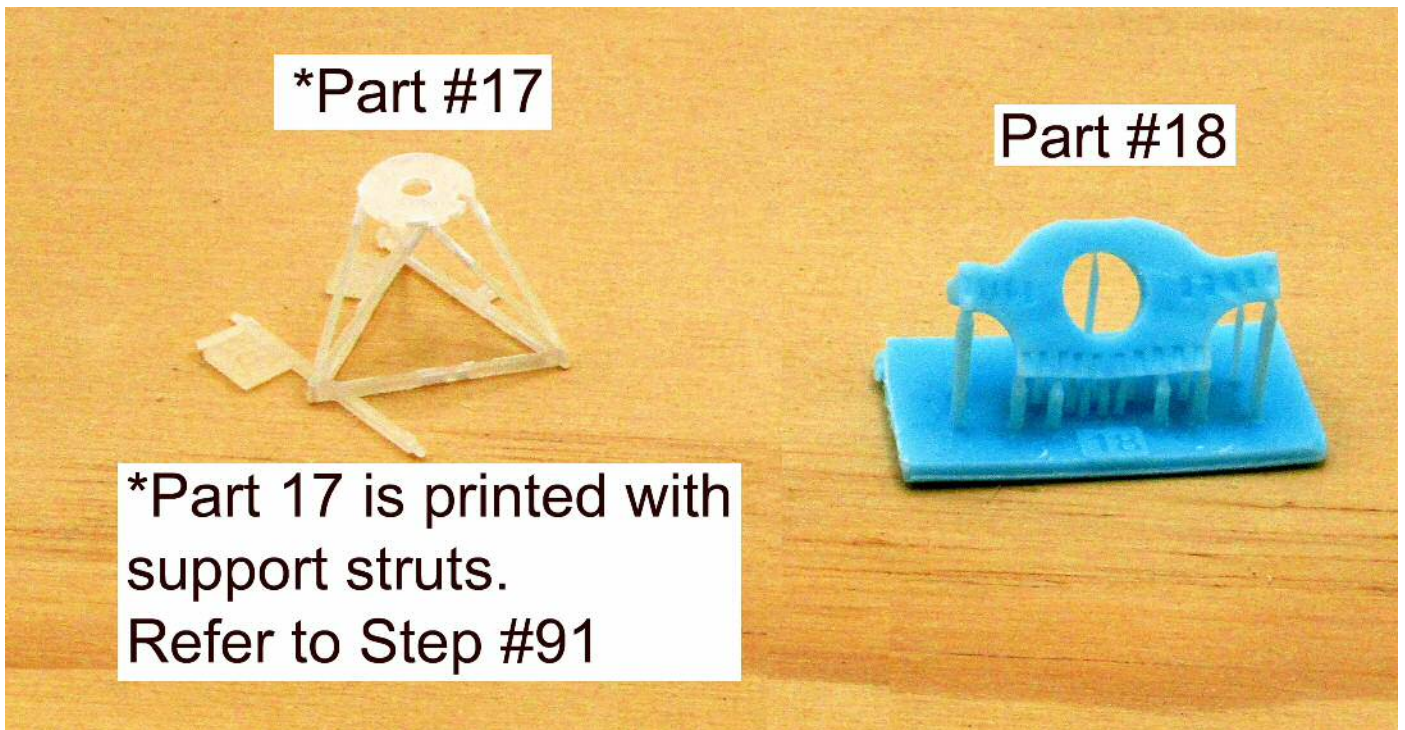
Refer to the instructions Step #82 & #83



This is the "web" for the high gain antenna



**Part #16 HGA  
Vac-formed Part**



**\*Part #17**

**Part #18**

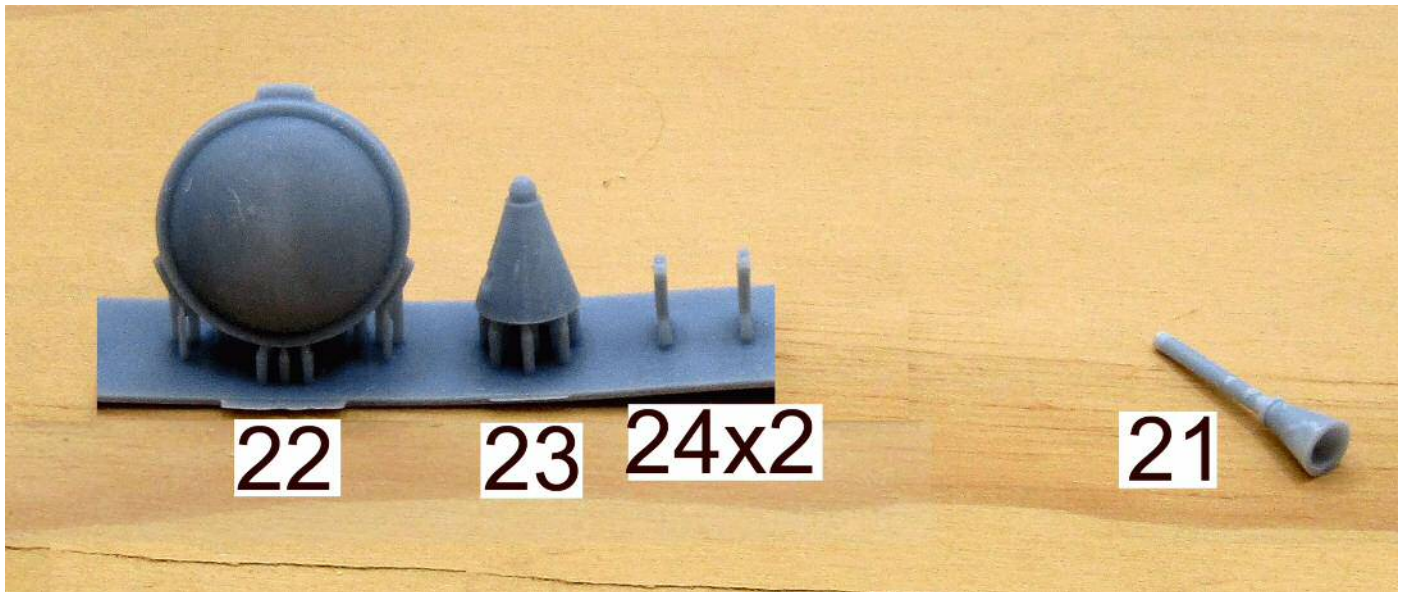
**\*Part 17 is printed with  
support struts.  
Refer to Step #91**

Top Row: Part #19x10

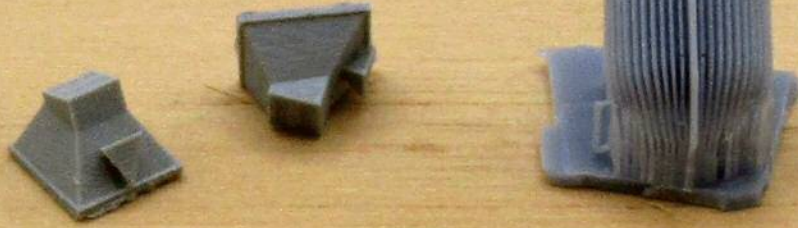
Note "20"  
part # tag

Note "19"  
part # tag

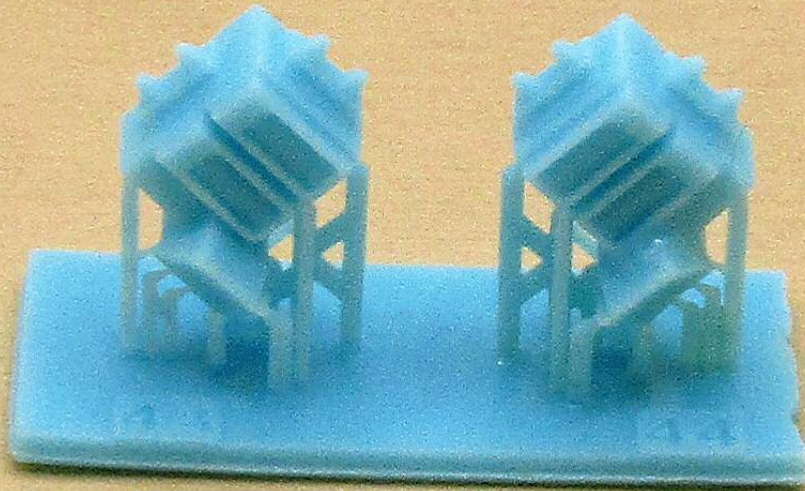
Bottom Row: Part #20x10



106x2



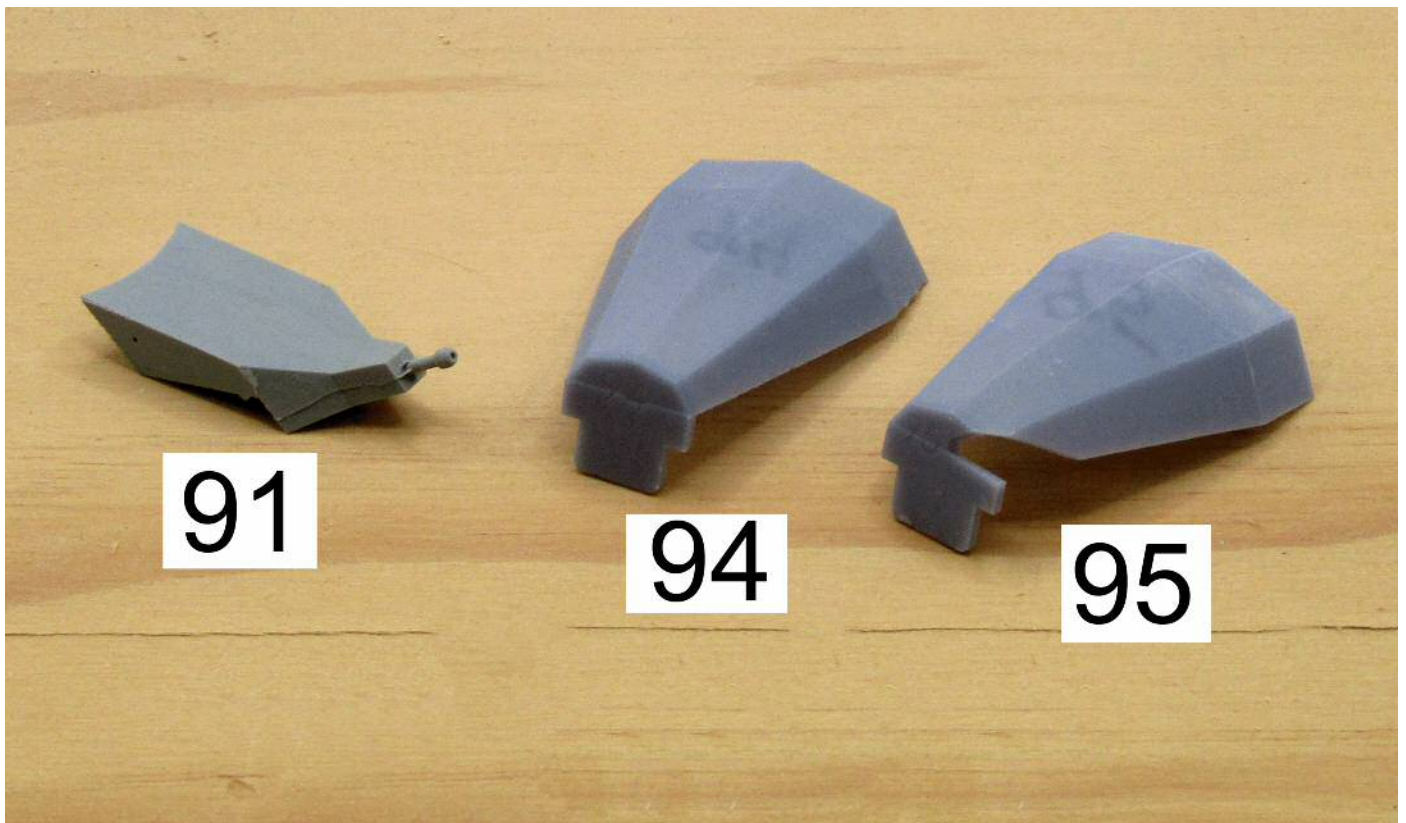
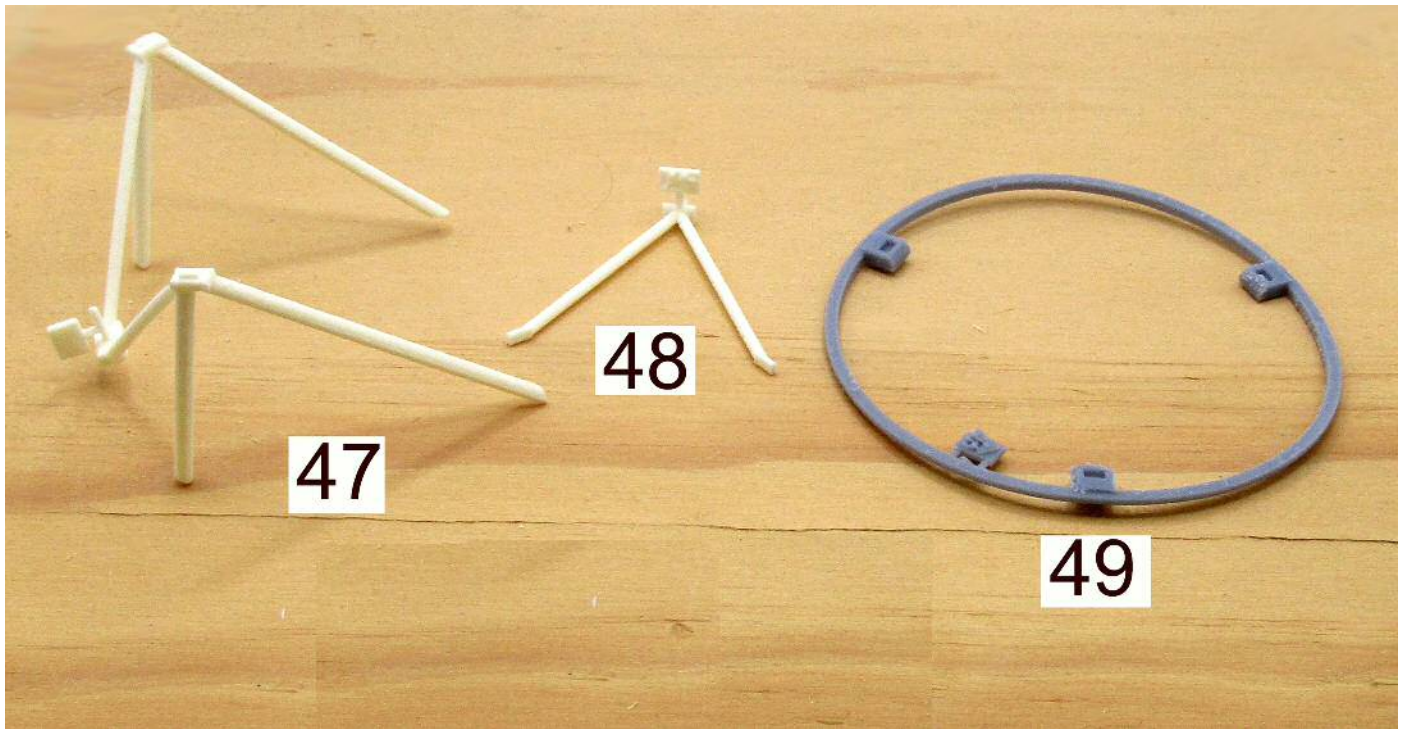
110  
MIMI-INCA



43

44

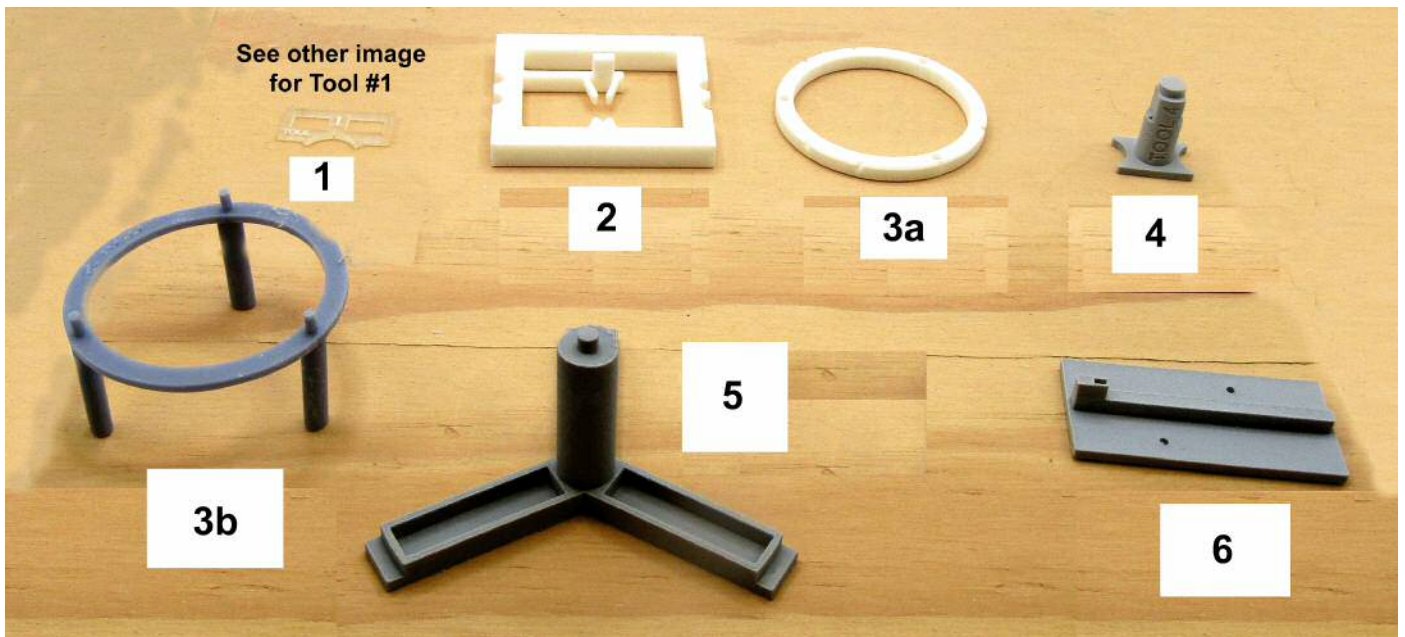
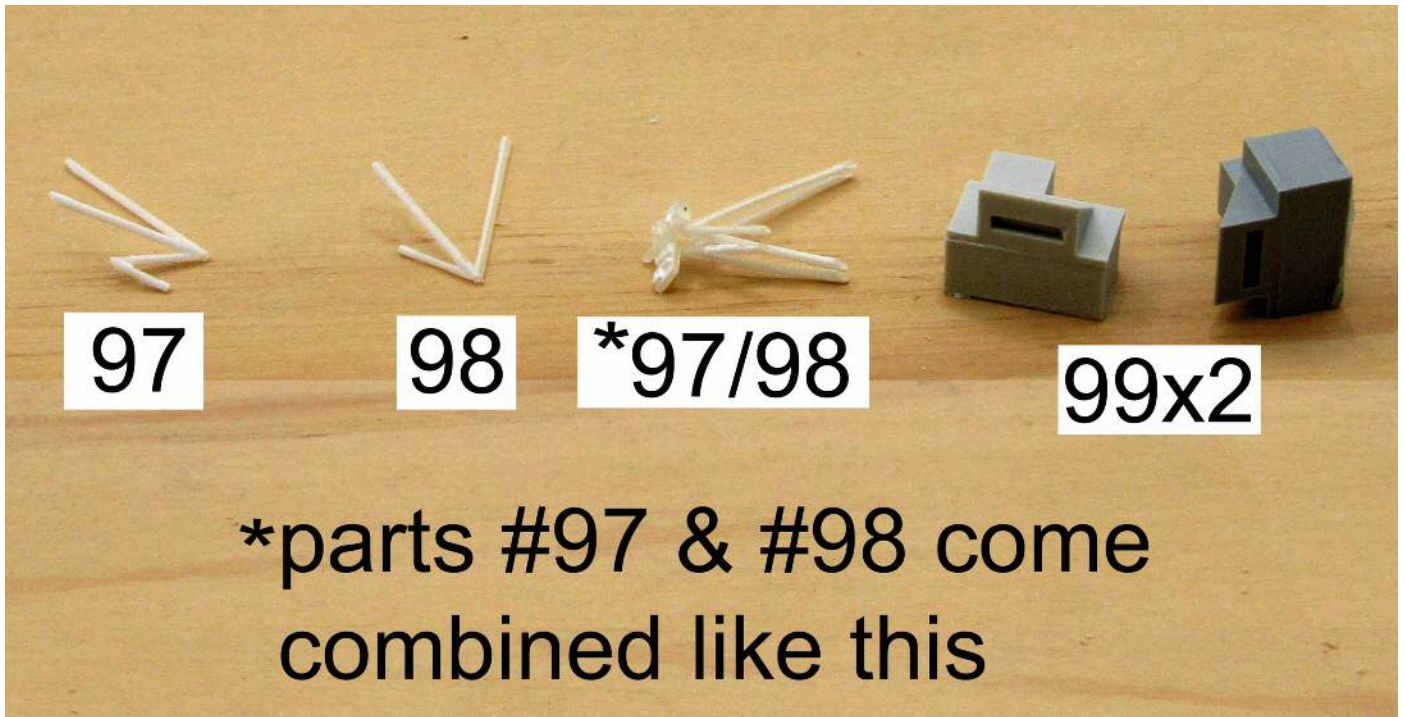
Note there are 2 of each of these parts



**Part 45**



**Huygens  
Aeroshell  
Back Cover**



Tools included with the kit.



**Tool #1  
for placement  
of PE on MIMI-INCA  
sensor assembly**

*Refer to Steps  
#71 - #73 in  
instructions*