International Space Station Paper Model Assembling User Guide Part 1: Unity

June 1999 Version
Flights: 1A/R
STS 88 ISS 01-2A

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Assembly Drawings: G. De Chiara

NOTE:
This Model is a test version. It was built from scratch on the basis of photos published by NASA. Please notify Raimondo Fortezza any error or discrepancy you could find during the assembly. The e-mail address is: fortezza@marscenter.it

Detailed pictures are available at NASA WEB site at: station.nasa.gov. Please check these images before the assembly to control the correct positioning of each part.

The modifications will be implemented according to your suggestions. Please notify them via e-mail. You will be kept informed when the updated version will be made available.

This model is free ware, and the idea is to develop the model 1:100 of the entire ISS.
If you want to support the initiative please send 10 US $, or even more if you like, to the developer. Your name will be posted in the Supporter List published on the Paper-ISS page at MARS WEB site and you can download all the updated version of the ISS with the new Modules that will be launched up to the end of the year 2000.
Quality printed model is available based on uncompressed files and 1440 dpi ink-jet printer. The cost is US $ 25 or an equivalent value in your currency. Send the money directly via mail to the address indicated at page 9. The model is shipped using ordinary post service. If you want express courier please send an e-mail for a quotation.

Unity Assembling Guide

Cut out and bend the parts following the line. For best results use a sharp hobby knife and a metal straight edge. For some parts a pair of small scissors is better. Glue together the parts using a thin, even coat of ordinary white glue. Print the sheets on a color printer. The format should be compatible with both A-4 or US Letter sheet size. I used an EPSON 750 Color ink-Jet Printer with a resolution of 1440 dpi with excellent results.

Unity parts are printed on two separate sheets. The first one should be printed on glossy paper (available for any ink-jet printer). The numbered parts belonging to this sheet are identified by the letter G followed by the part number.

The second sheet should be printed on cardboard paper (or Photo Paper) and its parts are identified by the label P

Cut the G-1 part and remove carefully with a sharp razor or small scissors the four door holes (remove the circles labeled with C)
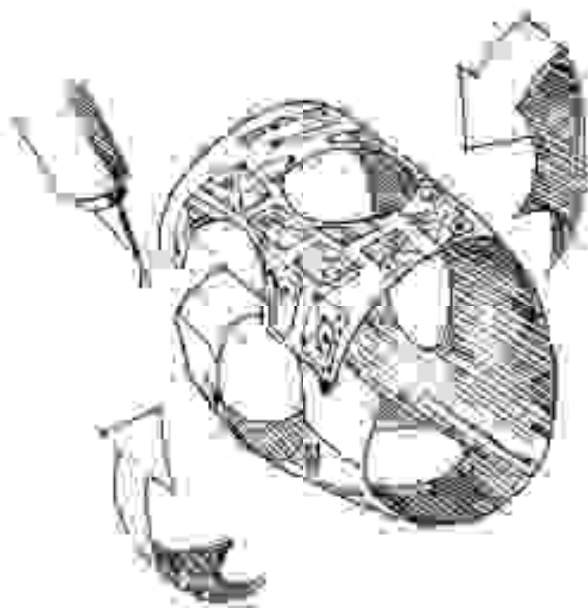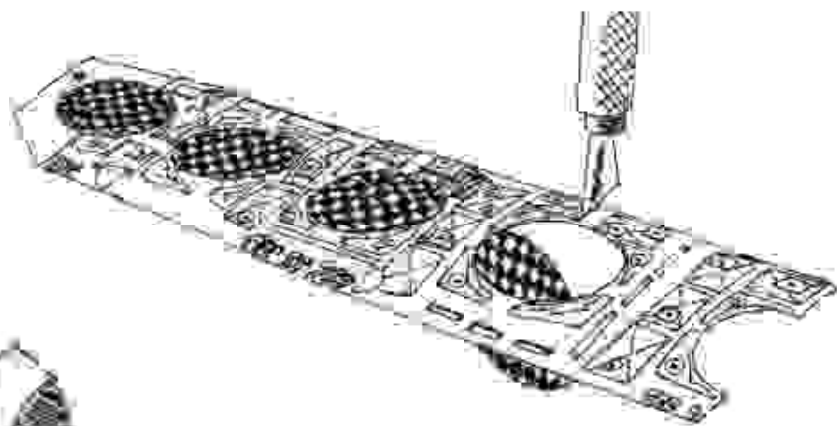
Roll the G-1 part on a table edge and, once the shape is similar to a cylinder, glue the tab and form the Unity body.

To improve the model accuracy you can decide to cut the gluing tabs from any cylindrical part and make a new separate one to eliminate the gap formed when a single part is rolled and glued on itself. See the following sketch to understand the modification.
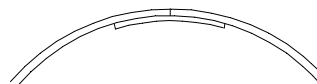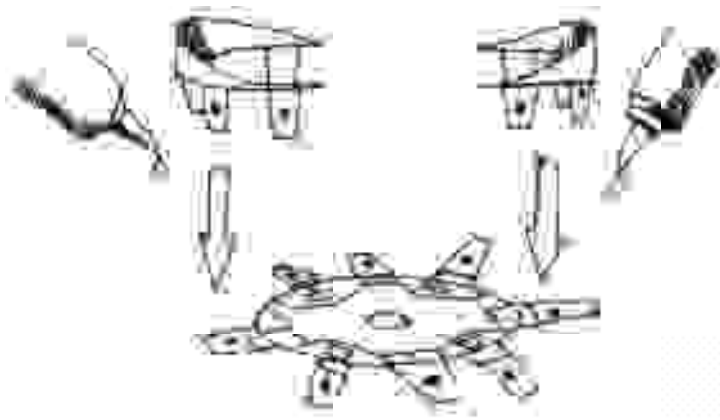
Cut the four hatches P-30, P-31, P-32 and P-33 and the eight G-6 parts. Glue two G-6 parts on each door. As a first step roll each G-6 part to form a half-circle. The painted part should be directed in the concavity. The G-6 tabs should be inserted between the gluing tab of the P parts. The two tabs located at 12 and 6 o'clock of the P parts should be placed between the G-6 parts.

Glue the four gluing tabs of each G-6 part under the P parts (hatches)

Bend the three gluing tabs of the P parts at 90° and glue them on the G-6 back side. Once the glue is dry, bend the residual part of the tabs again to have them oriented flat

As orientation of the model we decided to consider the hatch located near the part marked with (5) as the upper side of Unity. Prepare the four hatches. The P-33 is the upper hatch. P-30 and P-31 are located respectively of port and starboard. P-32 is the lower hatch.
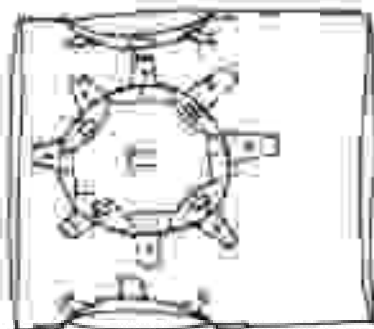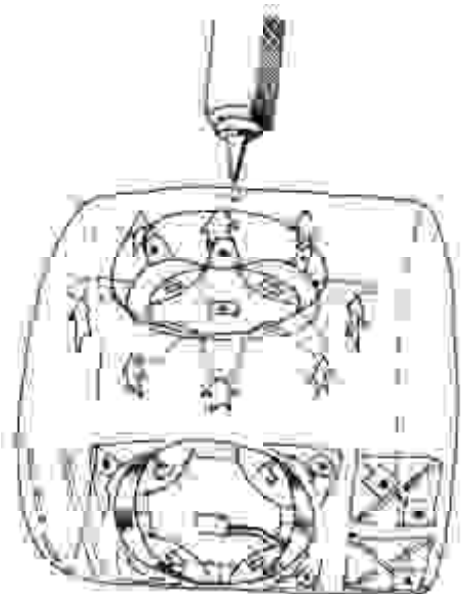
Each hatch has to be glued to the Unity body with the short tab oriented toward the closest edge. See the figures on the left side.
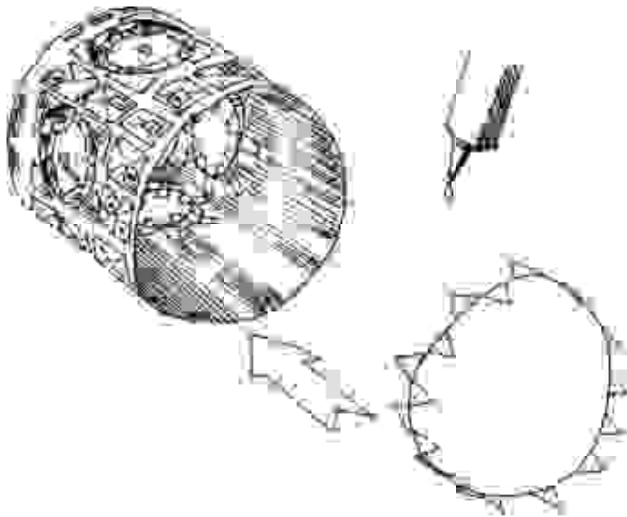
Insert the P-29 inside the Unity Body. The tabs have to be oriented alternatively on the two sides of the sheet. The glue has to be applied inside the body forming a ring close to the hatch tabs (near the center-line). This disc is used to reinforce the Unity structure. Check the disc dimension before the application of the glue.

Cut the PMA - Pressurized Mating Adapter (Parts G-12 and G-14). The G-12 is the forward one. Bend carefully each part to form an octagon (use a metal straight edge to bend each panel). Glue the white tab to form an octagonal prism.
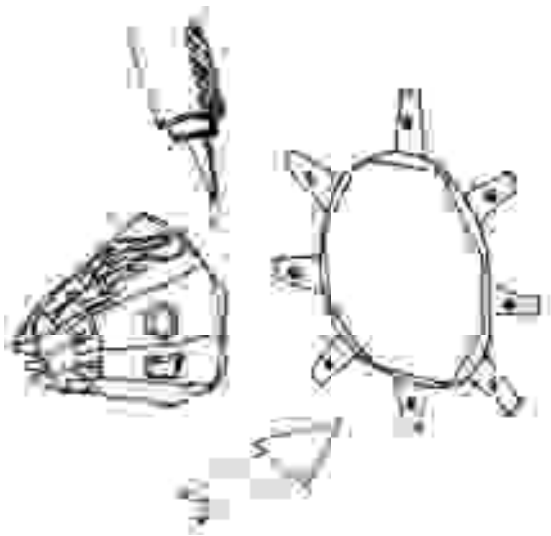
Bend the yellow tabs at 90 degrees ad glue them to P-34 and P-35.
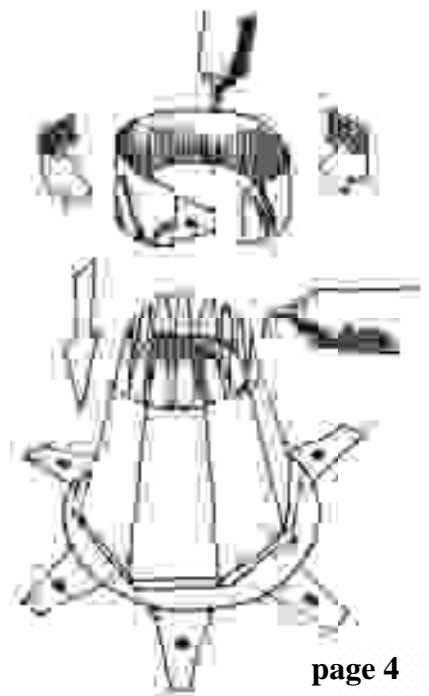
Cut G-11 and G-13. Roll them and glue the white tabs to form small cylinders. G-11 has to be attached to G-12. G-13 has to be attached to G-14. Rotate the cylinders until the harness is aligned. Glue the cylinders to the PMA's sticking the PMA black tabs inside the inner side of the cylinder using a pencil
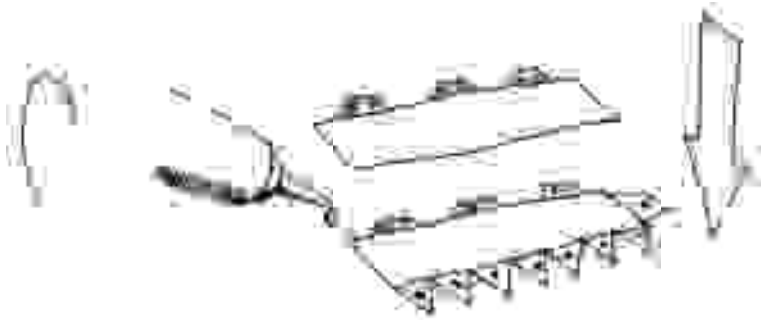
Prepare the PMA Mating Ring. Cut G-15, G-16, G-17, G-18. Glue G-16 on G-15 and G-18 on G-17. Leave 6 mm (the tab length) without glue on the side opposite to the tab.

Roll the coupled pieces to form a cylinder. The tab has to be glued inside the internal and external wall.
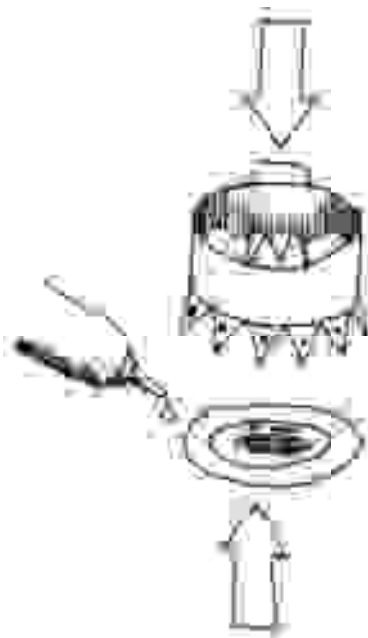
Cut the two P-36 hatches. Insert the hatch inside the Mating Ring and glue its tabs under the disc.

Cut parts G-8, G-9, G-21 and G-22. Roll G-8 and G-9 to form the Unity end cones. G-21 and G-22 should form two rings. Glue G-21 with end-cone G-8. G-21 has a small target to be glued as depicted in the small sketch. For the correct orientation of hatch, forward PMA, ring and Unity end cone see the picture in the next page.
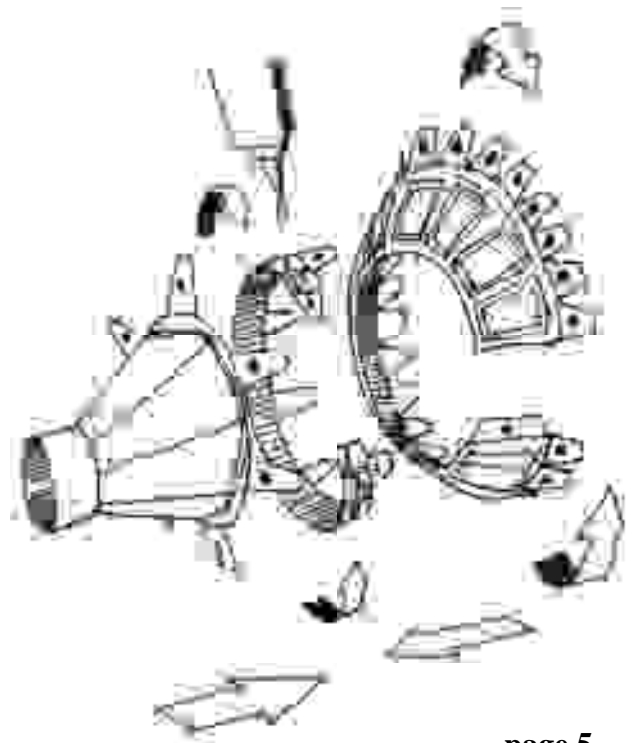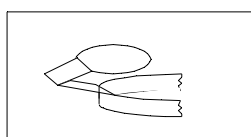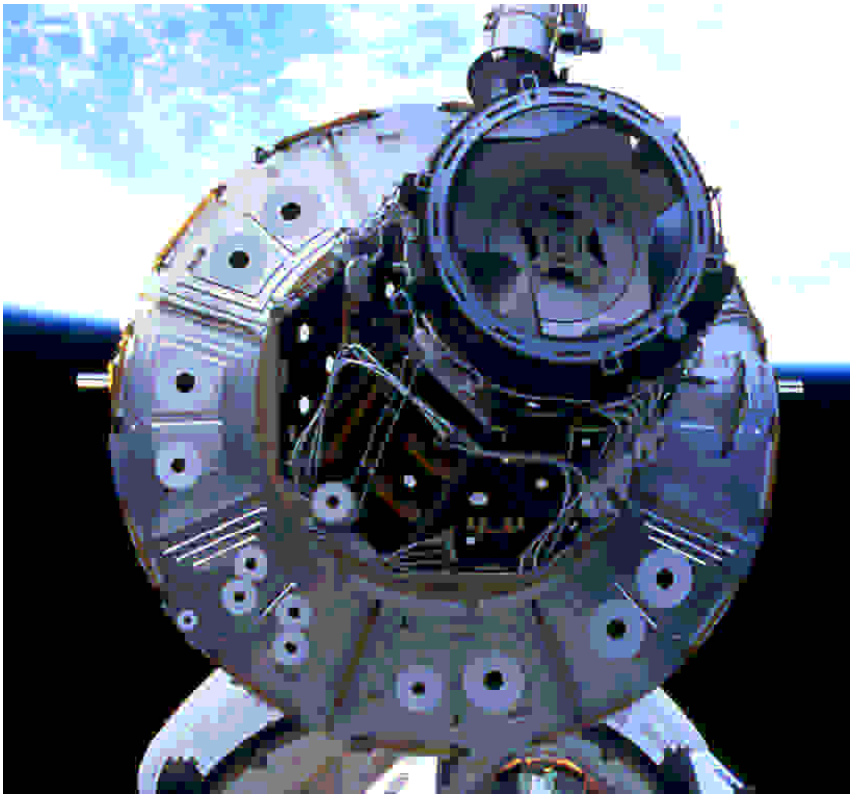
Unity (forward side) during
STS 88 mission.
(Courtesy of NASA)
Available at NASA WEB Site.

Glue hatch, forward PMA, ring and Unity end
cone (see the picture in this page for correct
aligning). Cut P-27 and P-28. P-27 has to be
glued on the forward end cone. Glue only half
of the existing end cone tab on the disc (i.e.
every alternate tab). The unglued tabs are used
to attach the end cones to the Unity body.

Repeat the same operation of the back PMA
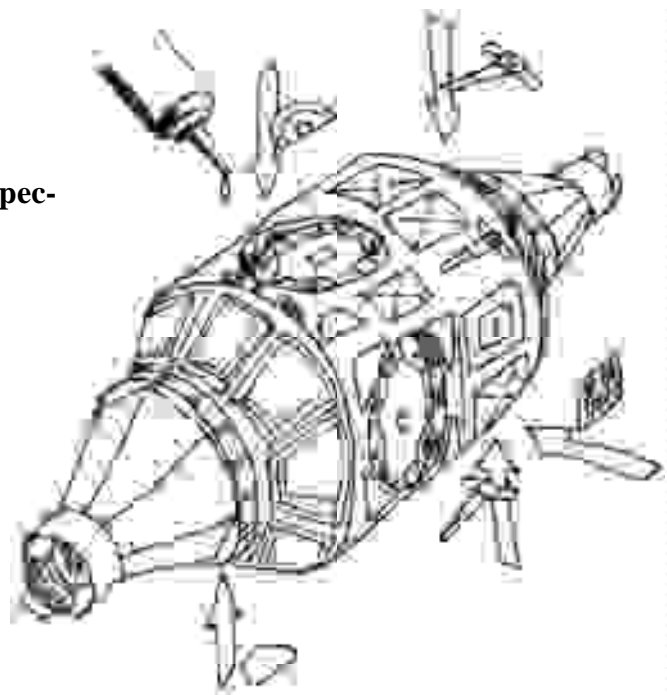and end cone of Unity
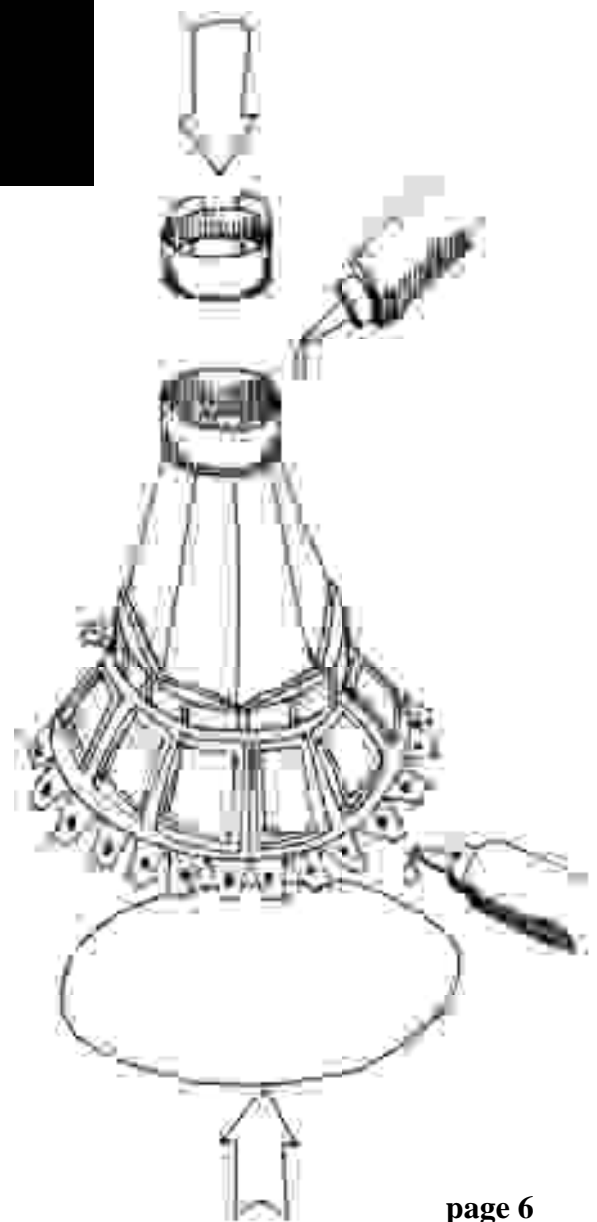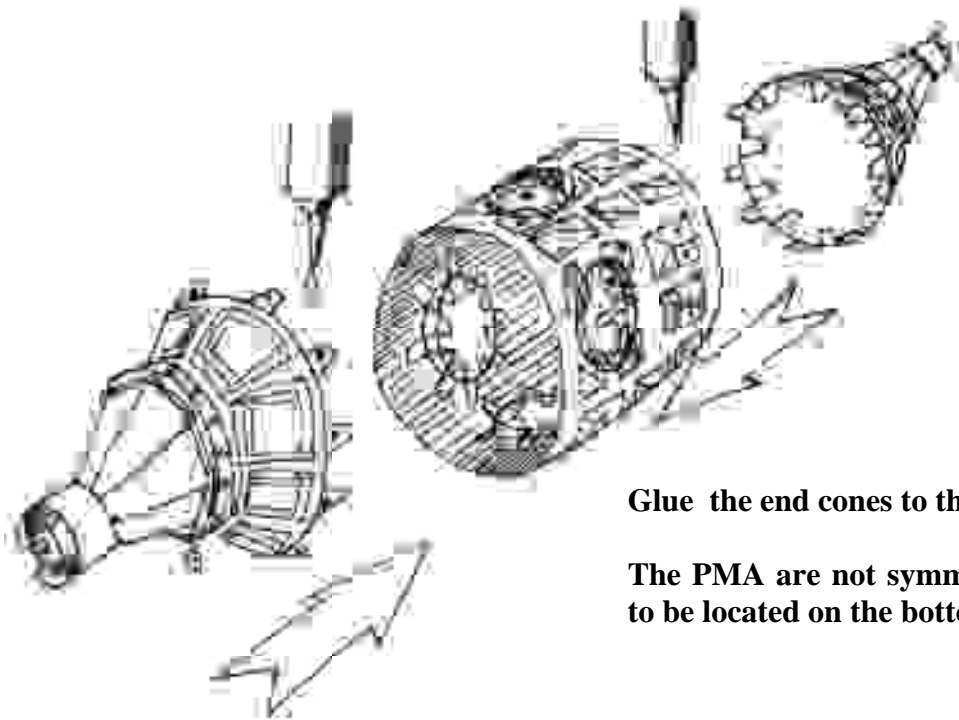
Glue the end cones to the Unity body.

The PMA are not symmetrical. The hatch has to be located on the bottom side.
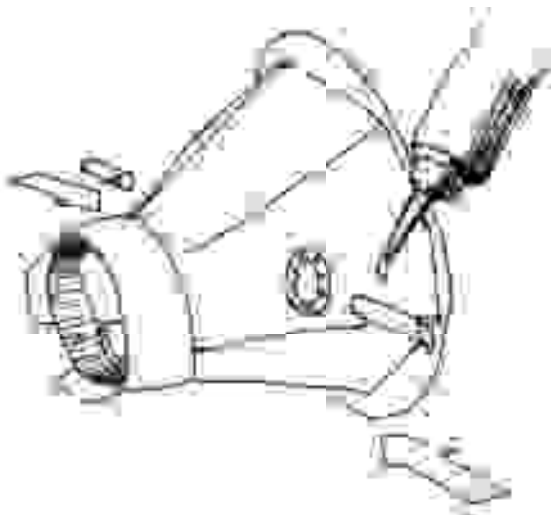
Glue G-2, G-3, G-4, G-5, G-7 on the respectively marked positions on the Unity body.
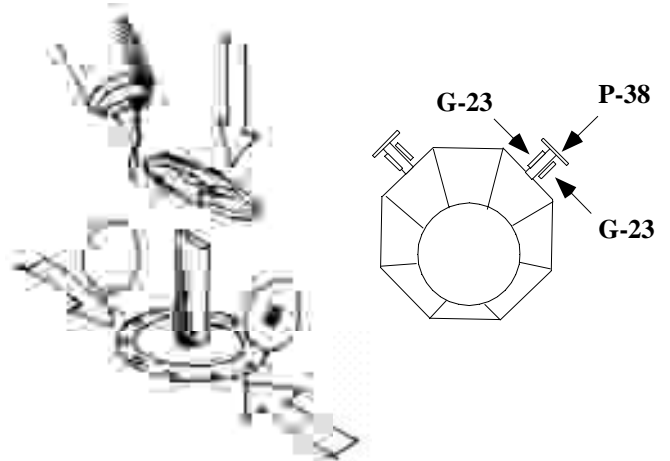
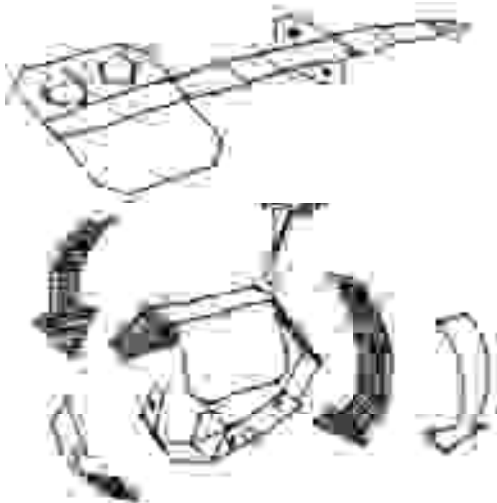Cut a 6 mm long part from a toothpick (two of them).
The cut should be at 90 degrees on both ends. They are the supports of the handles (to be grasped by the end-effector located at the end of the robotic arm)
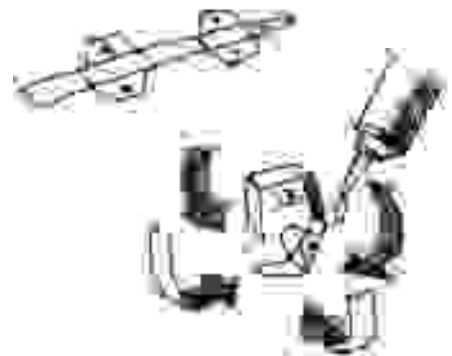
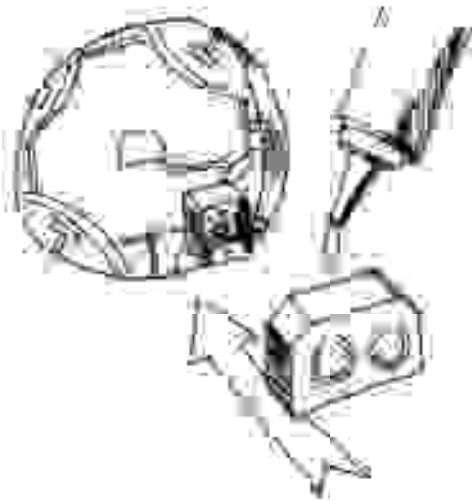Glue the sticks on the orange port holes located on the forward PMA.

Glue two G-23 targets on each side of a stick and P-38 at the tip of the support

Cut the two G-20 parts and glue the tabs forming two boxes as indicated in the figure.

Cut the two G-19 parts and glue the tabs forming two supports as indicated in the figure.

Glue the supports G-19 in the center of the port and starboard hatches of Unity. Glue on the support G-20 box oriented as illustrated in the figure.

Unity is ready. You can attach it to Zarya to form the International Space Station as it was after the last STS-96 flight during which two small robotic arms were attached to the two PMA's. The models of these robotic arms will be delivered together with the model of the Service Module expected to be launched next November.
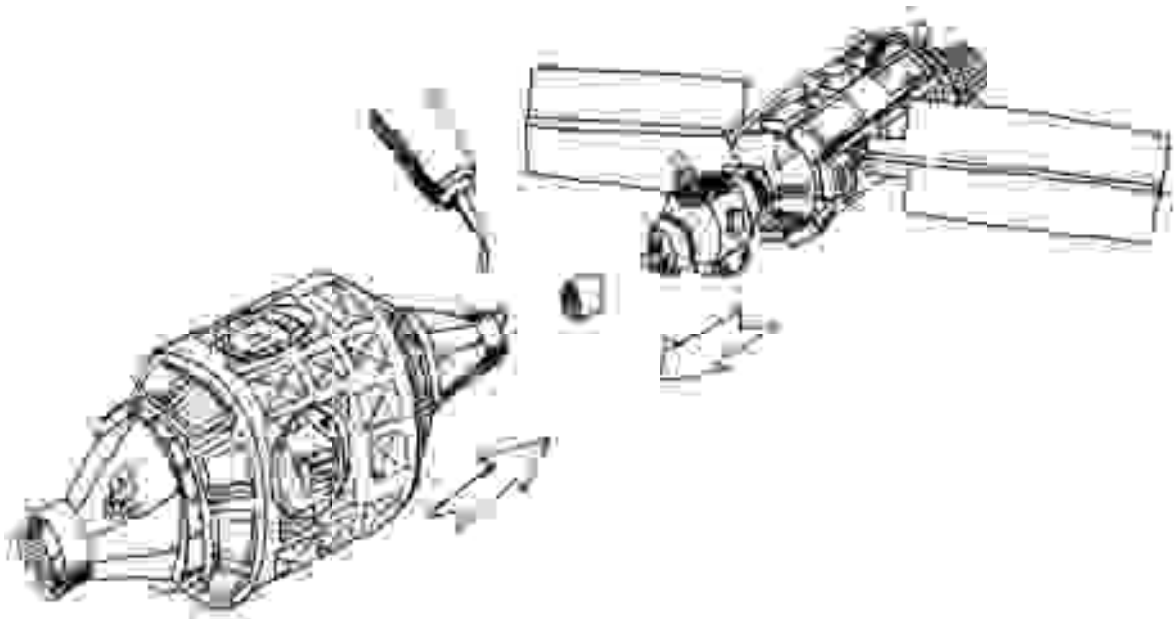
My address is:
Raimondo Fortezza
Via A. Falcone, 58
I-80127 Naples
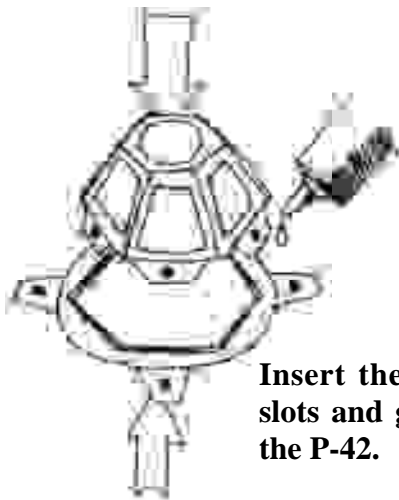## Italy

Cupola (draft) Optional

The Cupola is an optional part. it is a draft version because it is based only on the available drawings. It will be launched on ISS assembly flight 27 (August 2003). if you want a realistic flight model don't mount it.

Cut G-26 and bend the windows, gluing the lateral tabs to form the cupola.
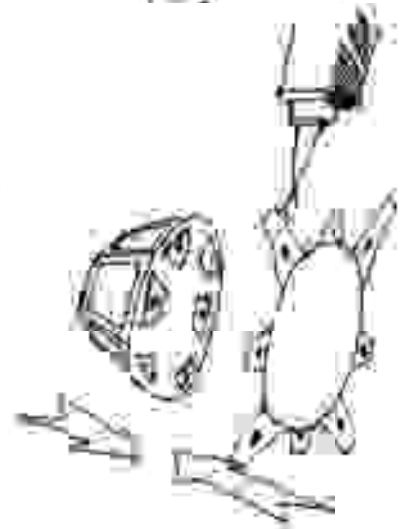You can use the Transparent version (ciano-acrylate glue is required)

Cut P-42 and remove the red stripes using a sharp razor.

Glue the cupola on the P-40. The painted part is the upper side. Glue the smaller tab of P-42 and P-40 together

Insert the cupola tabs in the P-42 slots and glue the cupola tabs under the P-42.

Cut P-39 and P-41. Glue them together on the unpainted part. Glue the cupola assembly on the upper part. Cut the G-24 and form the attachment ring. Glue the ring tab on the lower disc. Attach the cupola on the starboard side of Unity on the hatch.

Cut G-25 and form a conical ring. Glue the G-40 tabs inside the ring.