ISS – 4.5” 1:40 scale

- Building this model requires a moderate level of modeling skill and an intimate familiarity with the International Space Station structure – see http://www.nasa.gov/mission_pages/station/main/index.html

- Model is approximately 1:40 scale; sized to use 2 liter soda bottles to shape the modules. The finished model will be 6 feet high across the main solar arrays, just over 8 feet wide across the main truss, and about five feet long along the main spine where the modules mount.

- Most sections consist of a cylinder using a bottle as a form and two end caps. More complex shapes are formed from cones and boxes. Sections are assembled with 1 ¼ inch PVC tubing running though the part and connectors where needed. Most conics are formed by cutting on the solid radial lines, then forming and overlapping to the dotted line.
  - Non-structural connections are made with either a paper tube rolled to the same outside diameter as the tubing (1.68 inch/43mm) or with slip-fit cylinders. These connections include the cupola, airlock, JEM small experiment module, the PIRS docking compartment and Soyuz spacecraft.
  - To make a slip-fit docking connection, first close the open ends of the modules to be joined with a circular piece of card. Using a mandrel (cylindrical form), roll and glue a cylinder at least 1 inch long from card stock. When dry, roll a second cylinder over the first, wrapping tightly. When gluing the second cylinder, make sure you don’t glue it to the first (inner) piece. Cut a ½ inch (1 cm) section from both cylinders and glue one piece to each of the parts to be joined. When dry, the two cylinders should slip over each other for a friction fit. Secure with glue for a permanent display.

- The truss is assembled from hexagonal and rectangular box sections. Each section is capped and that end cap has a hole to allow the 1 ¼ inch PVC support tubing to pass through. The tubing runs off-center to accommodate the shape of the S1 and P1 truss sections.

- The main solar arrays are made from plain paper segments (to save weight) supported by a 3/16 inch dowel glued up the center of each array. The arrays are mounted to the truss using a 7/32 inch brass tube secured in a hole drilled through the main truss PVC support tube. The solar array dowels then slip into the tubing.

- The radiators for the solar arrays are suspended from a dowel attached to the main truss and attached to the outer end of the radiator.

- The main thermal radiators are suspended from a stiff wire that runs up the center of the mount, then bends 90 degrees and extends out to connect with the end of the top radiator panel. All three panels are tied together at the outer end with a strip of card to hold them up.

- The finished model should be suspended from (or supported at) at least four points: both ends of the truss, the center of the truss, and the back end (Progress/Zvezda) of the central spine.

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**STRUCTURAL SUPPORT CEILING HANGER DISPLAY**

**Vertical connection must be glued**
- **EYE BOLT**
- **ZVEDZA**
- **ZARYA**
- **36 inches**
- **SOYUZ ATV ETC.**
- **ADDITIONAL NODE LATER**
- **1 ¼ INCH PVC**
- **11.25 inches**

**Drill 7/32 hole through main tube and epoxy brass tube in place. Slip fit dowel into brass tube.**

**ADDITIONAL STRUCTURE (NODE, LS MODULES, CREW VEHICLES) ATTACHED WITH GLUED PAPER TUBING: NON-STRUCTURAL**
- **RADIATOR SUPPORT WIRE BENT INTO BASE.**
- **TRUSS SUPPORT**
- **Z1 TRUSS**
- **54-60 inches**
- **EYE BOLT**
- **5 feet**
- **8 feet**
- **6 feet**
- **36 inches**

**SOLAR ARRAY SUPPORT 3/16 dowel**
- **EYE BOLT**
- **SOLAR ARRAY SUPPORT 7/32 4” brass tubing**

**NODE**
- **DESTINY**
- **COLUMBUS**
- **JEMM**
- **PROGRESS**
- **JEMM PALLET**
- **13.5 inches**
- **6.5 inches**
NODE – docking adapter
PIRS DOCKING COMPARTMENT
FGB/UDM
Zarya (use radiator array)
Research Module
(RM has two solar arrays set at 90 degree angle, no radiator, only aft set of narrow equipment boxes)

SERVICE MODULE
Zvezda
Multipurpose Lab Module

See NASA web site for details on positioning of equipment boxes, radiator, and solar panels.

Cut out circular opening to attach docked spacecraft or modules. Use slip-fit cylinders to form attachments.

Detailed airlock if used. Use on second set of modules mounted below station, not on main spine. If used on spine modules, enlarge end cap hole to fit armature.
CONIC FORMER
CUT OUT CENTER FOR ARMATURE
FOLD TABS IN ALTERNATE DIRECTIONS
TO CONNECT TO CONES (2) FORE AND
AFT OF THE FORMER.

RUN U-SHAPED COAT HANGER WIRE FOR
SUPPORT. BEND UP INNER ENDS TO HOLD
ALIGNMENT.

RADIATOR PANELS NEXT PAGE
Two panels, cut long center line, fold
on short verticals, pierce dots for
support wire.
RESEARCH MODULE VARIANT – SOLAR ARRAYS
RESEARCH MODULE VARIANT – SOLAR ARRAYS
EQUIPMENT CABINETS
FGB/UDM

EQUIPMENT CABINETS
DETAILED AIRLOCK SECTION
FOR FGB/UDM OR SM
SERVICE MODULE

INNER SOLAR PANEL

INSERT COATHANGER WIRE FOR SUPPORT. RUN FULL LENGTH OF INNER AND OUTER PANELS.

FOLD AND GLUE. INSERT TABS BETWEEN LAYERS OF OUTER PANELS.
SERVICE MODULE

OUTER SOLAR PANEL

PRINT ON PLAIN PAPER
SERVICE MODULE

OUTER SOLAR PANEL
SERVICE MODULE

AFT CYLINDER
Columbus lab is also logistics module, typically dismounted after loading/unloading and lands with Shuttle.
JEM EXPOSURE
FACILITY

PALLET

EQUIPMENT
BOXES
LIFE SUPPORT MODULE (future)

END CONES

BODY CYLINDER
RESEARCH MODULE
DOCKING/STORAGE
MODULE (future)

END CONES

END CAP FOR CONIC
IF NEEDED – COVER
WITH HATCH IF EXPOSED

OPTIONAL FLAT END CAP
RESEARCH MODULE, DOCKING/STORAGE MODULE (future)
Flexible straws sleeved together – sections about 7 inches long. Cover with white tape or paint.
Z1 TRUSS - enlarged
Z1 TRUSS
enlarged

SIDES
Z1 TRUSS
enlarged

S0 TRUSS
TRUSS ALIGNMENT

S0

S1

S 3-4 inner

TRUSS ALIGNMENT

S 3-4 i

S 3-4 outer/S 5-6
S0 TRUSS
JEMM SIDE
S/P 3-4 TRUSS
INNER
S/P 3-4 TRUSS
INNER
S/P 3-4 TRUSS
INNER
S/P 3-4 TRUSS
OUTER

OUTBOARD
S/P 3-4 TRUSS
OUTER
S/P 3-4 TRUSS
OUTER
S/P 3-4 TRUSS
OUTER

OUTBOARD
S/P 3-4 TRUSS
OUTER
S/P 5-6 TRUSS
INNER
S/P 5-6 TRUSS
INNER
S/P 5-6 TRUSS
INNER
S/P 5-6 TRUSS
INNER

OUTBOARD
S/P 5-6 TRUSS
OUTER

OUTBOARD
S/P 5-6 TRUSS END CAPS

OUTER CAPS
S/P 5-6 TRUSS
END CAPS

OUTER CAPS
Glue up reinforcing beams from card stock rectangle sized to match width of solar array.

Beam profile – about ½” wide.

Mounting rod – 36” plus length to insert into truss.

Glue reinforcing beams at ends to gold side; cut hole to run mounting rod through bottom beam; butt-glue rod to top beam to support array.
SOLAR PANEL – FRONT; ONE OF SIX PER ARRAY; EIGHT ARRAYS TOTAL. (48 PAGES)

PRINT ON PLAIN PAPER – back to back with next page, use “gold side” to guide cutting.
Use overlap on bottom edge to connect to next segment
SOLAR PANEL – FRONT; ONE OF SIX PER ARRAY; EIGHT ARRAYS TOTAL. (48 PAGES)

PRINT ON PLAIN PAPER – back to back with next page, use “gold side” to guide cutting.

ALTERNATE – PRINT ON BLUE PAPER; GLUE NEXT PAGE ON BACK
SOLAR PANEL – BACK; ONE OF SIX PER ARRAY (48 PAGES)

PRINT ON PLAIN PAPER – cut out panel from this side.

ALTERNATE – PRINT ON YELLOW/GOLD PAPER
Use overlap on bottom edge to connect to next segment
SOLAR PANEL – RADIATOR. ONE OF FOUR; ONE PER ARRAY AXLE. TRUSS 4&6.

ADD TO SUPPORT AND CONNECT

ATTACH TO BACK SIDE OF TRUSS

OVERLAP TO CONNECT
THERMAL RADIATOR. EIGHT SECTIONS PER STRING; THREE STRINGS PER TRUSS; MOUNT ON TRUSS 1. (print page 12 times total)

PRINT ON PLAIN PAPER
THERMAL RADIATOR – HALF MOUNT. FOUR PARTS TOTAL TO MAKE TWO MOUNTINGS. TRUSS 1 MOUNT.

This part will need a support – use stiff wire to hang radiators. Base of each radiator set attaches to mount. Mount attaches to truss (see NASA website for detail).