

## InSight Mars Lander Scale Model

Version S1, model design © 2019 Michael Mackowski

This 1/24th scale paper model represents the general arrangement of the InSight lander spacecraft as it appeared after landing on Mars in December 2018.

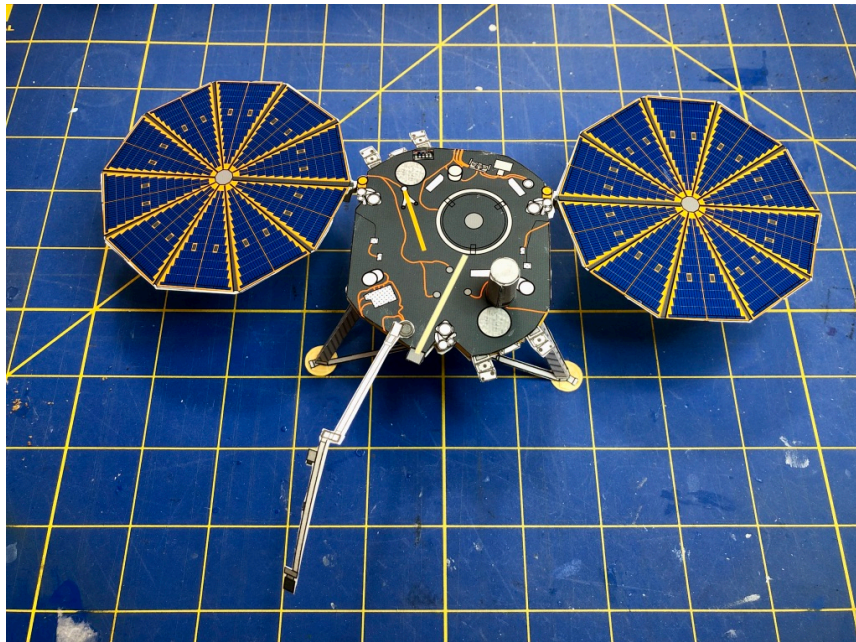
### General Instructions

Tools and materials needed:

- Scissors
- Hobby knife
- White glue (optional: glue stick, Alene's Tacky Glue)
- Optional: removable low-tack tape, small clamps

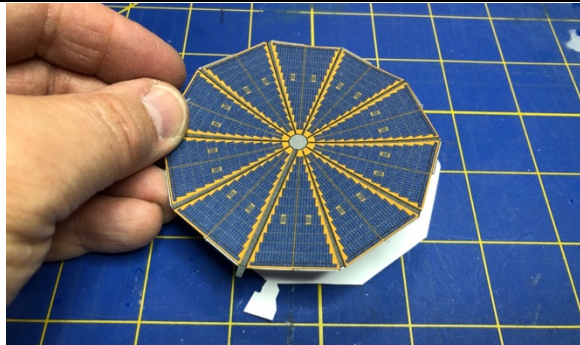
The model should be printed on heavy cardstock and can be cut out using scissors or a hobby knife (e.g., X-Acto). As the plans are pdf files, make sure your print at 100% if you want to have an accurate 1/24<sup>th</sup> scale model. The dashed lines on the drawings indicate folds. To get a sharp fold, lightly score the paper (before or after cutting) with a dull pointed object like an orange stick (cuticle stick for cosmetics) or a dried ballpoint pen. Alternatively, a dull hobby knife can be used with care and a very light touch, being careful not to cut all the way thru. Most of these scores are on the front (printed) side, and where a score on the reverse is required, that is noted on the drawing. Note that not all scores/folds are shown, as the obvious ones (main bus structure panels for example) are indicated by features of the drawing itself.

Areas on the drawings that are filled with a dot or hatched pattern are usually gluing surfaces. White glue (e.g., Elmers) is recommended, while a glue stick is recommended for the solar panels. You may need to hold the pieces together for a few minutes to allow the glue to set. This can be done by hand, small clamps, rubber bands or low tack tape. Remember to use only a little bit of glue, as the more you use, the longer it takes to dry.

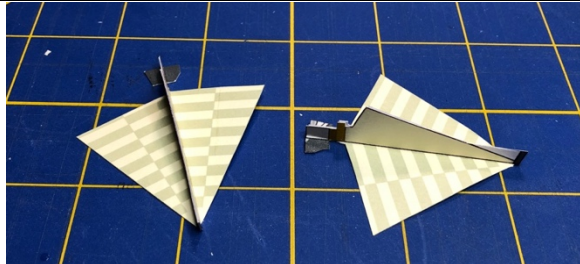


## Building Your Model

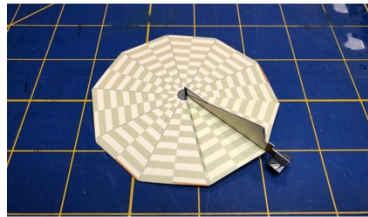
Cut out the solar panels and use a glue stick to secure the top sides to the under sides. Note the alignment of where the panels attach to the main spacecraft body (arrow). Keep note of left and right panels.



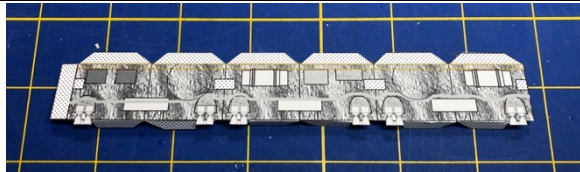
Fold the solar panel supports in half (score on the front) and then inwards (score on the back) and glue the middle sections together.



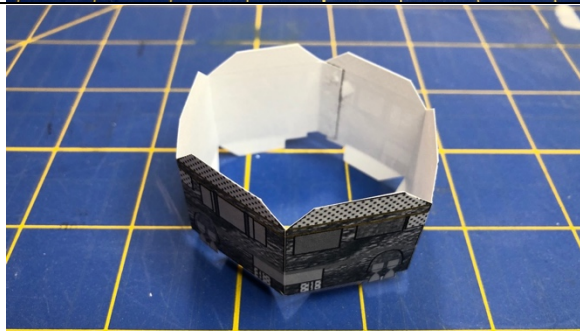
Note the numbered pieces and locations at the main attach points and then glue the supports to the panel undersides.



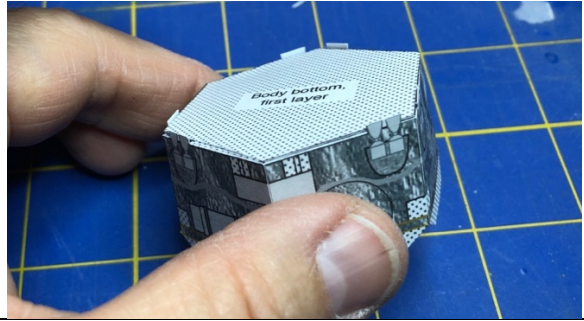
Next we'll build the main body. After cutting it out, score the top and bottom attach flaps being careful not to score or fold the engine nozzles.



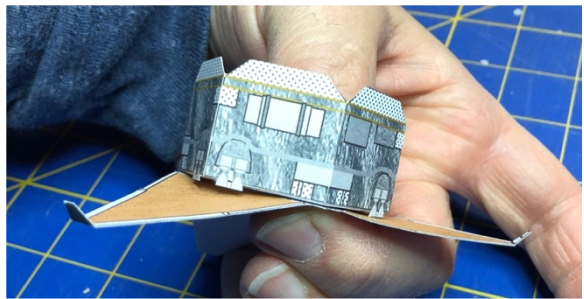
Then fold it into a hex shape and glue the end tab to the opposite panel.



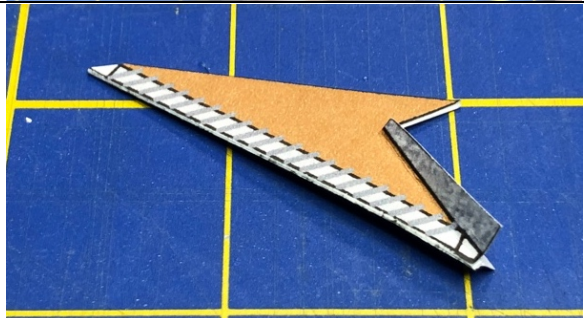
Next cut out the bottom panel and glue it on, making sure to leave the engine nozzles popped out.



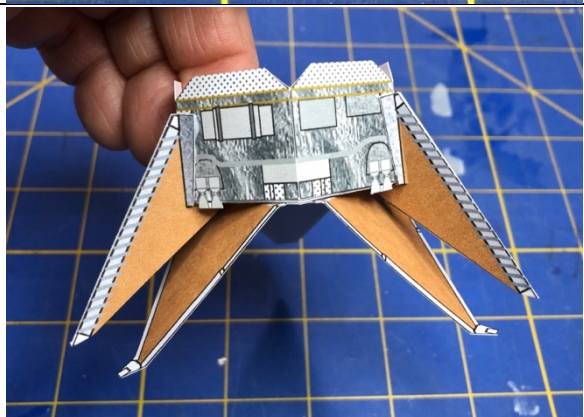
Cut out the legs, which consist of three main struts and a triangular support truss. (The support truss could have the internal brown area cut out to be more accurate, but it also makes it more flimsy.) On the triangular support truss, fold the legs downward towards the center and score on the backside to tilt the footpad areas upwards. Then glue it to the base, making sure to align the legs with the engine nozzles corners.



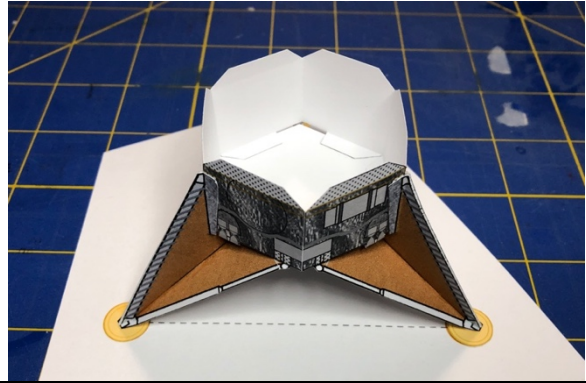
The three main struts also are creased front and back. The main crease folds it in half, and then fold the two gray attach areas forward. Glue each leg over on itself as shown.



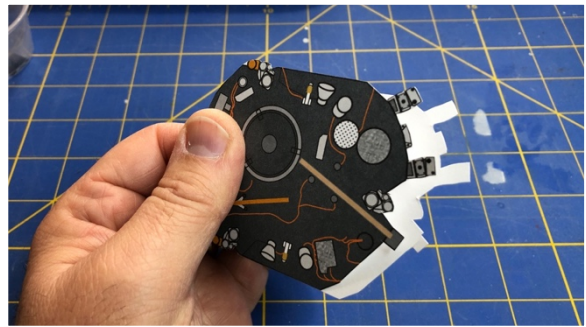
Next glue each leg to the corners aligned with the main center truss. The notch in each leg should be flush with the bottom of the main spacecraft box.



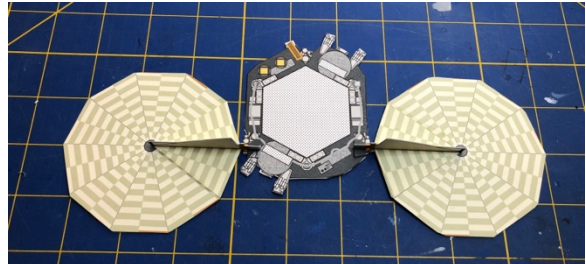
Next put a narrow strip of glue along the edge of each main leg strut and glue it to the lower truss triangle. Then cut out the three circular landing pads and glue those on using the leg alignment template as a guide. This will form a sturdy set of legs.



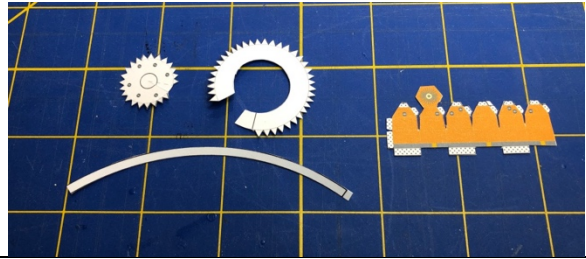
Cut out the top deck panels (top and bottom). Line them up and carefully glue them back-to-back using a glue stick.



Place the deck with the bottom facing up and glue the two solar panels on (use white glue), at the hatched attach points. Make sure they line up straight. Let the glue set before disturbing.



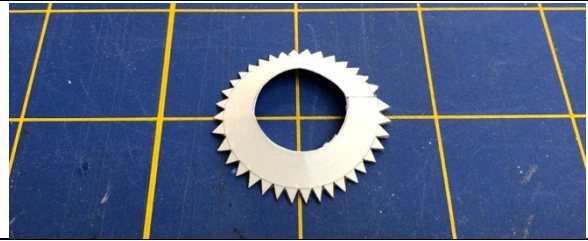
While the solar panels set up, cut out the seismometer and its wind cover. There are a lot of creases to score, so use a dull hobby knife to carefully prepare these folds, including around the circular pieces to fold the triangular attach tabs. (If these pieces are too small for the particular builder, just cut out the flat [deployed, reference] parts instead.)



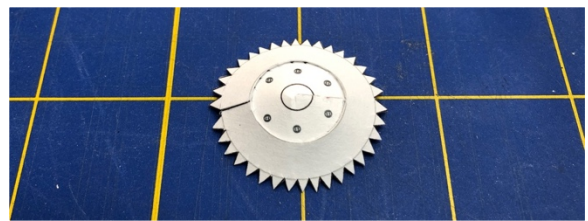
Start with the small center part of the wind cover. Make a slit to the center, gently curve it into a shallow cone, and glue one edge over the hatched portion. The photo shows a small clamp holding the glue joint.



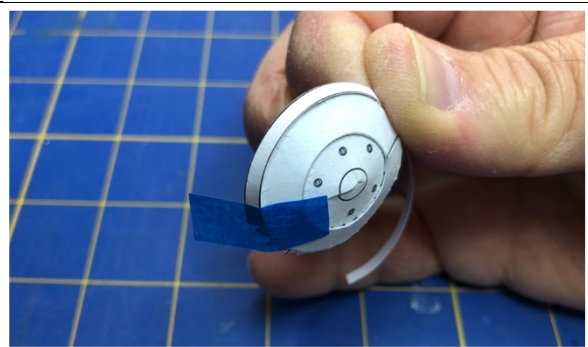
Next, wrap the larger partial-donut shaped piece around itself, forming a shallow conical section, and glue the tab to the other end.



Glue these two pieces together by applying a bead of white glue along the underside of the conical section. Make sure to center the small one within the larger one.



Fold down the sawtooth attach tabs around the outside of the prior assembly (wind cover). Then wrap the narrow, curved piece around the outer edge and use a clamp or low-tack tape to temporarily hold it in place. Then glue it to the triangular attach tabs, a little at a time.



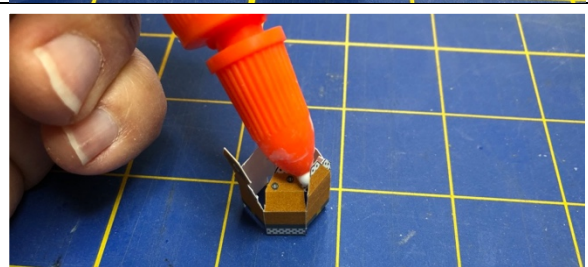
Be careful to keep it aligned so it wraps around the entire wind cover squarely.



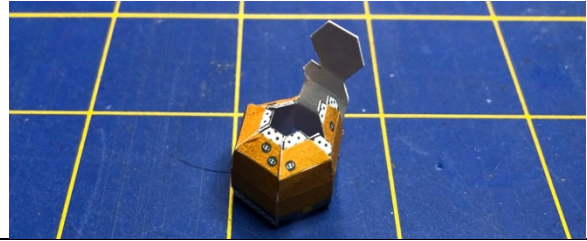
The seismometer (SEIS) itself is small with a lot of tricky cuts and tabs and folds. After cutting and scoring, wrap it around itself and make a hex shape.



Then start at a section next to the one with the top center cover, and glue its little tab under the adjacent section. Let it dry (maybe five minutes) and do the next section.



Continue this process (be patient) until you have a hexagonal dome, then fold down and glue the top center section.



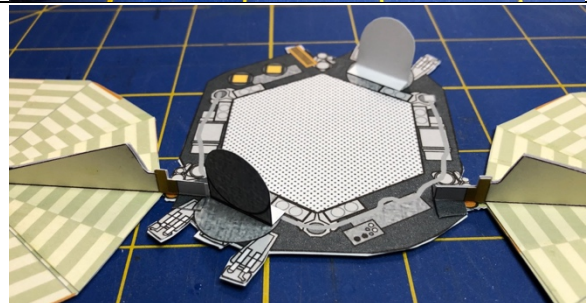
The heat probe is simply two halves with a base that will match the design on the main deck.



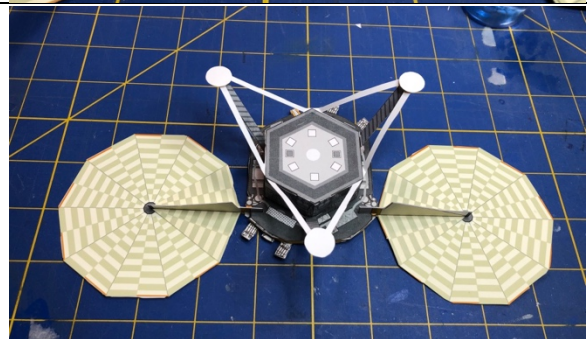
The communications antenna is built by gently curling it into a cylinder, gluing the ends together, and then folding over and gluing the lid. A helpful intermediate step is to shape it into a nice cylinder by inserting a pen or pencil and rolling it in your fingers while the glue is still soft.



While the previous steps are drying, you can cut out and glue the fuel tanks to the underside of the main deck.



Now glue the deck and solar panels to the main structure. Make sure you line up the legs so two are opposite the solar panels. Note there are rectangular tanks on the side of the main structure that are on the same sides as the solar panels. Glue this before attaching anything to the top of the deck so you can apply some pressure to this assembly, so it dries nice and flat.



Finally, assuming you want to show the InSight as it landed, glue the SEIS instrument, wind cover, antenna, and heat probe to the main deck. Cut out the (top) robotic arm and glue it to the circular mounting spot on the deck. There is an optional underside version of the arm if you want to make it double thickness.

Optionally, you can display them deployed by using the extra (orange) flat cable parts provided.

