

# The Sun in 3-D: A New Frontier in Solar Research



## NASA's STEREO Mission

STEREO (Solar TERrestrial RELations Observatory) is a 2-year mission employing two nearly identical space-based observatories to provide the first-ever 3-D "stereo" images of the Sun to study the nature of coronal mass ejections. These powerful solar eruptions are a major source of the magnetic disruptions on Earth and a key component of space weather, which can greatly affect satellite operations, communications, power systems, the lives of humans in space, and global climate.

STEREO is the third mission in NASA's Solar Terrestrial Probes Program. The twin observatories are scheduled to launch aboard a single Delta II rocket from Cape Canaveral Air Force Station, Fla., in summer 2006.

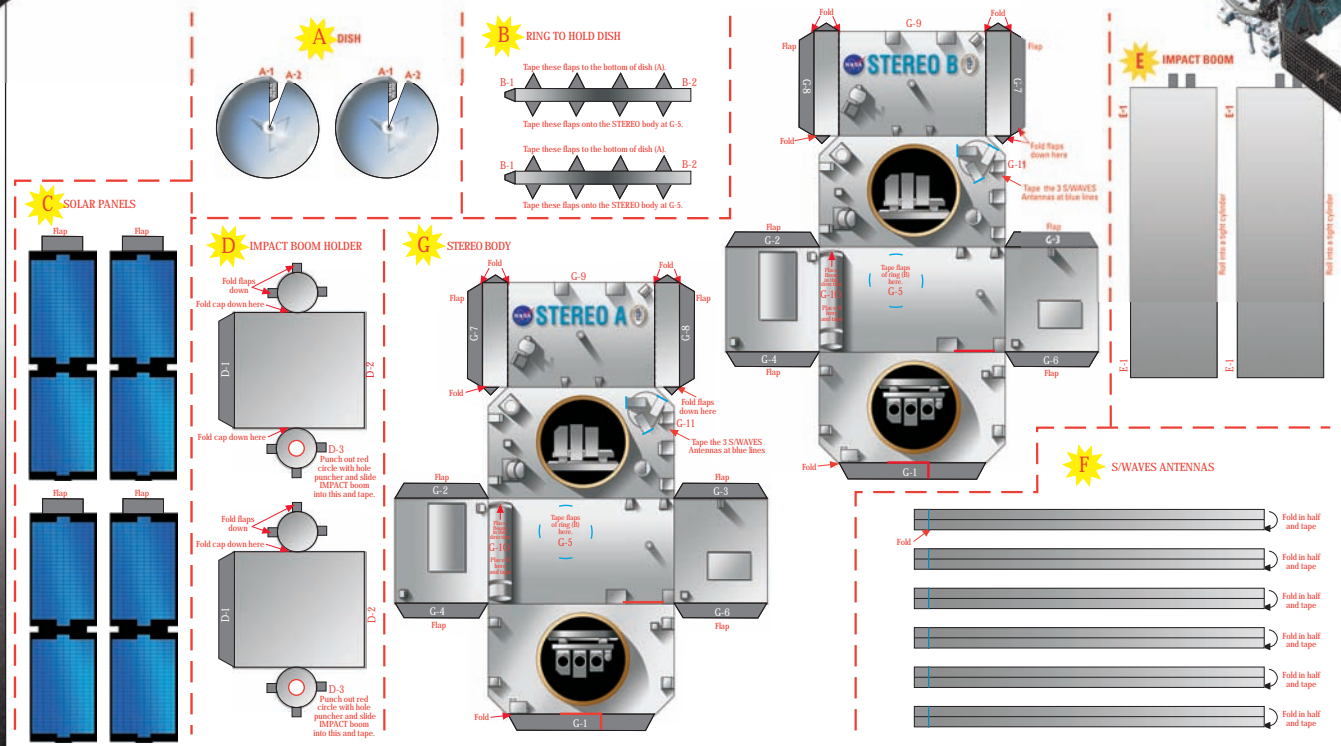
## 3-D Views of the Sun

The twin observatories will fly as mirror images of each other to obtain unique "stereo" views of the Sun's activities. They must be placed into a rather challenging orbit where they're offset from one another. One observatory will be placed ahead of Earth in its orbit around the Sun and the other behind. Just as the slight offset between your eyes provides you with depth perception, this placement will allow the STEREO observatories to obtain 3-D images and particle measurements of the Sun.

## Seeing with STEREO

Each twin STEREO observatory will carry two instruments and two instrument suites. This combination provides a total of 16 instruments per observatory. The Johns Hopkins University Applied Physics Laboratory, in Laurel, Md., designed and built the spacecraft platform housing the instruments. When combined with data from observations on the ground or in low-Earth orbit, STEREO's data will allow scientists to track the buildup and liftoff of magnetic energy from the sun and the trajectory of Earth-bound coronal mass ejections in 3-D.

<http://stereo.jhuapl.edu>



STEREO is sponsored by NASA's Science Mission Directorate, Washington, D.C. NASA Goddard Space Flight Center's Solar Terrestrial Probes Program Office, in Greenbelt, Md., manages the mission, instruments and science center. The Johns Hopkins University Applied Physics Laboratory, in Laurel, Md., designed and built the spacecraft and will operate the twin observatories for NASA during the 2-year mission.





# Create Your Own STEREO Observatories

**INSTRUCTIONS:** Adult supervision suggested. Follow steps A – G to complete the STEREO Observatory A and repeat to complete STEREO Observatory B. Please read all instructions before starting. Estimated time: 1 hour.

**MATERIALS NEEDED:** Scissors, hole punch, tape or glue.

## A. DISH

1. Cut out a dish.
2. Bring **A-1** and **A-2** together with the dark gray flap in back of **A-2**. Tape this in place and set aside.

## B. RING TO HOLD DISH

1. Cut out a ring.
2. Tape flap **B-1** behind **B-2** to form a ring. This will hold the dish onto the STEREO body at **G-5**.
3. Tape one set of 4 (folded out) tabs of ring to bottom of dish, centering ring on the bottom side of the dish and set aside.

## C. SOLAR PANELS

1. Cut out 2 solar panels (both are identical) and set aside.

## D. IMPACT BOOM HOLDER

1. Cut out the IMPACT boom holder and fold the flaps down.
2. Punch out red circle **D-3** with the hole punch.
3. Go to **E. IMPACT Boom** and assemble.
4. Tape **D-1** flap under **D-2**. This forms a cylinder. Fold over both caps and insert flaps and tape them into the cylinder and set aside.

## E. IMPACT BOOM

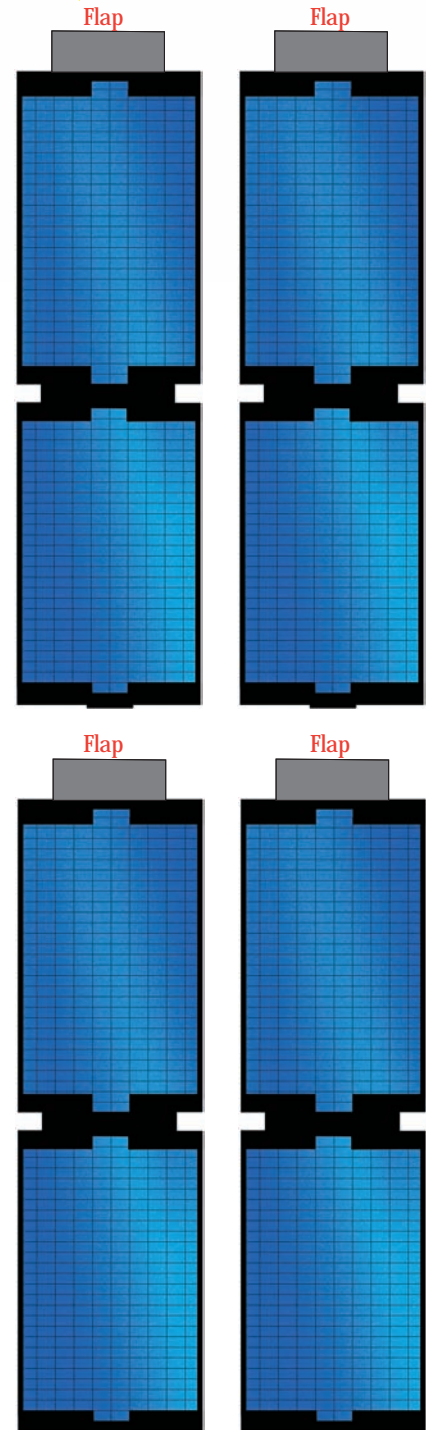
1. Cut out the IMPACT boom. Starting on the **E-1** side, roll this into a tight cylinder (wrap around a pencil or coffee stirrer to shape). Tape together.
2. Insert this IMPACT boom cylinder into the **D. IMPACT Boom Holder** at **D-3**. Tape dark gray flaps to the inside of the IMPACT boom holder.

## F. S/WAVES ANTENNAS

1. Cut out 3 S/WAVES antennas. Fold these in half lengthwise and tape so that they lie flat. Fold gray flap at blue line.

## G. STEREO BODY

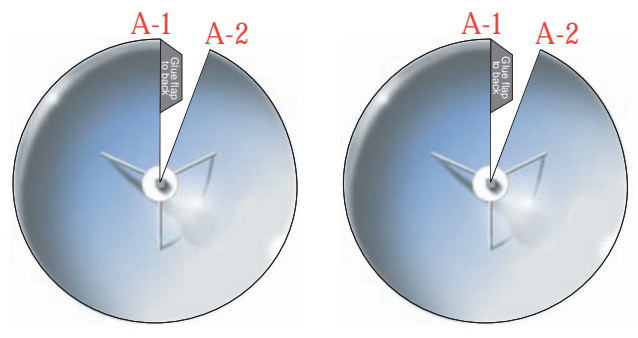
1. Cut out entire STEREO body. Score all interior black lines so they fold easily. Fold all the dark gray flaps down. Cut all red lines with scissors (be sure not to go beyond the red line).
2. Attaching the **Solar Panels (C)**: Insert and tape the flap of 1 of the **Solar Panels (C)** into the **G-1** cut red line you previously cut. Insert and tape the second solar panel in the red line previously cut near the **G-6** flap. Both solar panels are positioned opposite each other with blue side up.
3. Attaching the **IMPACT Boom (E) and IMPACT Boom Holder (D)**: Tape the assembled **IMPACT Boom** and **Holder** on top of **G-10**. See **G-10** arrow for position of the boom.
4. Attaching the **Dish (A) and Ring (B)**: Tape the 4 flaps of the **Ring (B)** over the 4 blue lines at **G-5**.
5. Attaching the **S/WAVES Antennas (F)**: Tape each of the 3 **S/WAVES Antennas (F)** gray flaps to the blue lines at **G-11**.
6. Bring flap **G-1** to **G-9** and tape flap under **G-9**.
7. Fold over **G-2** and **G-4** panel to meet with **G-7** and tape.
8. Fold over **G-3** and **G-6** panel to meet with **G-8** and tape.



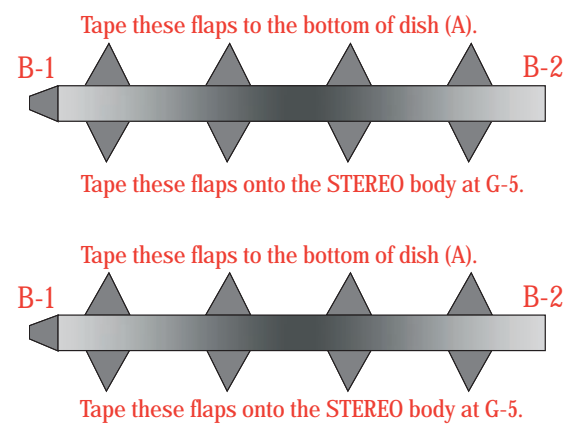
To learn more, visit: <http://stereo.jhuapl.edu>.

Congratulations! You have successfully built your own twin observatories.

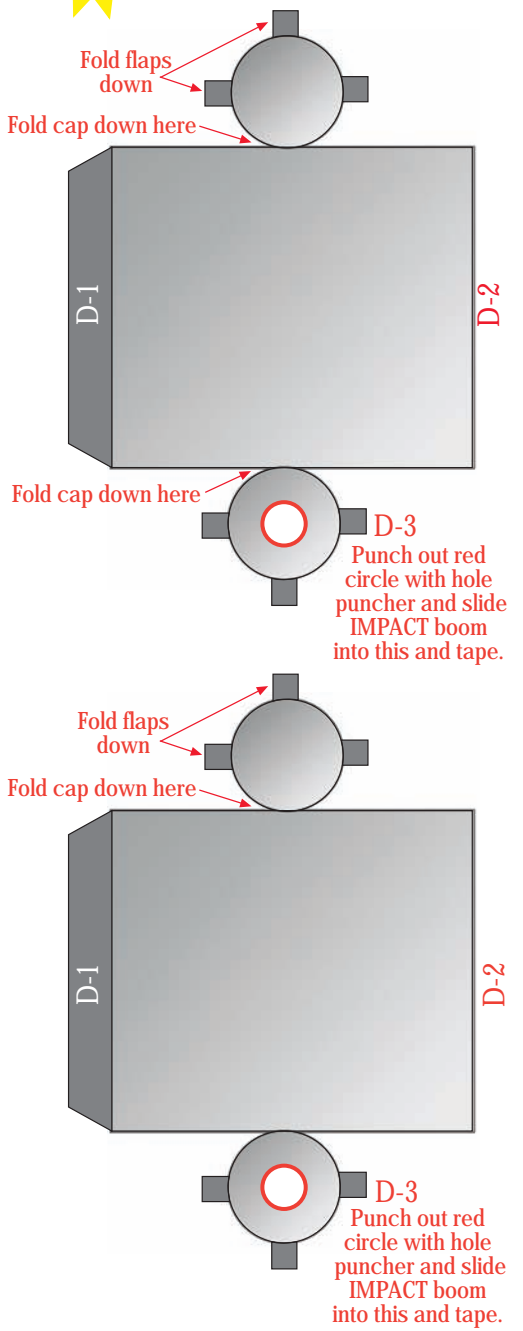
**A** DISH



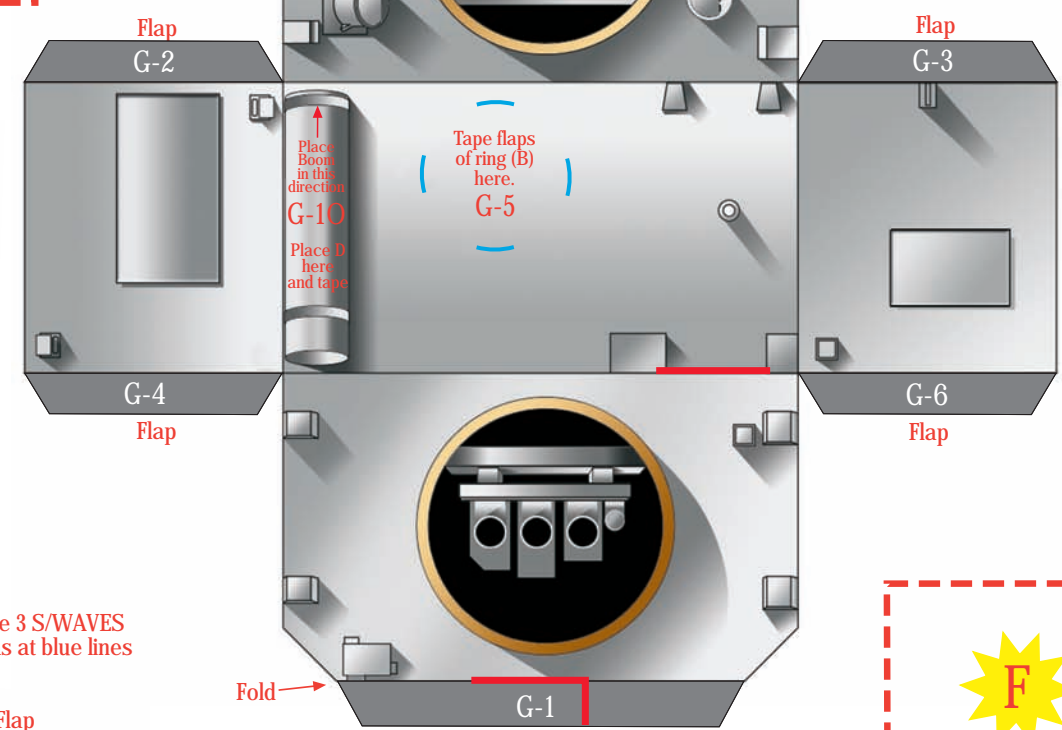
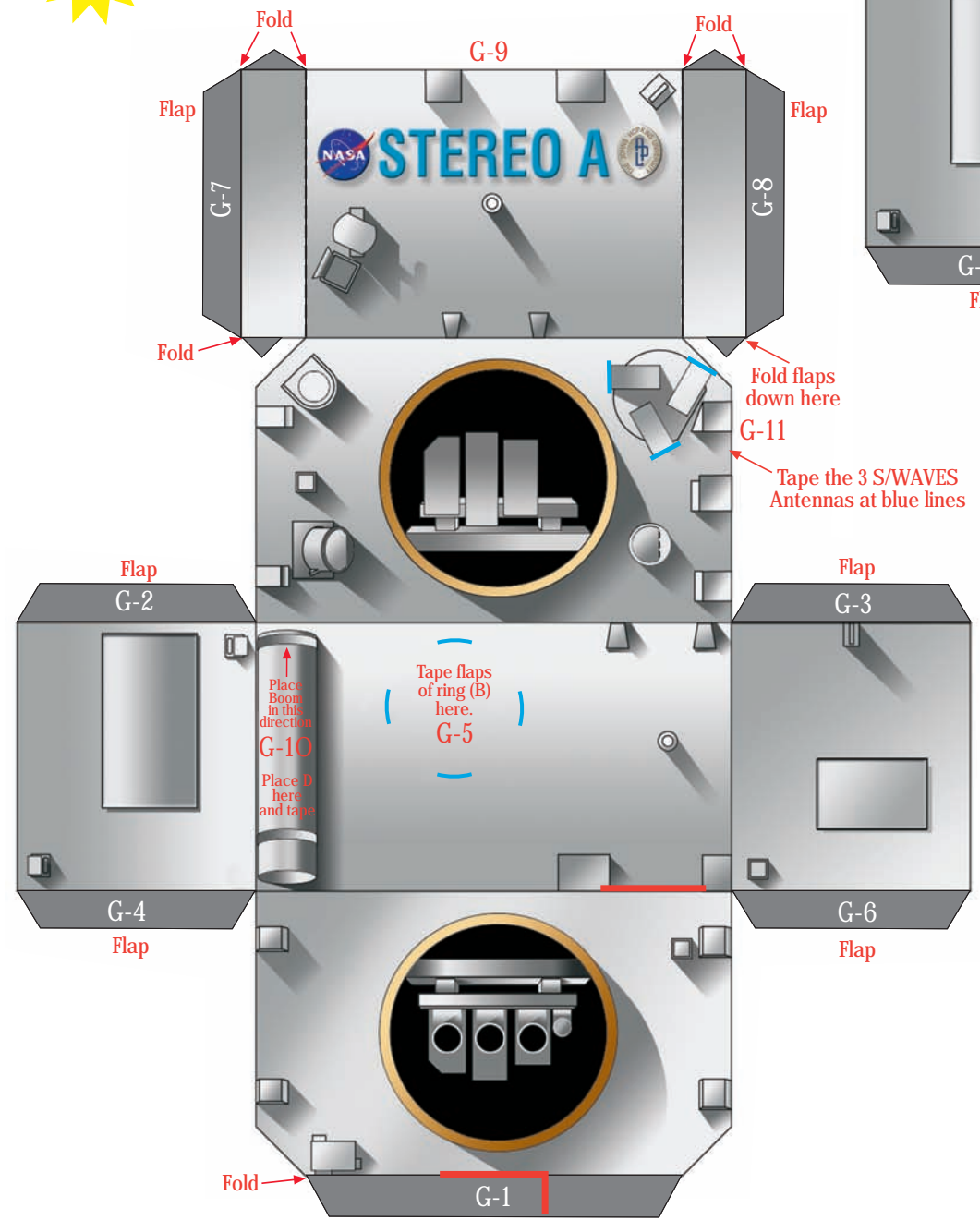
**B** RING TO HOLD DISH



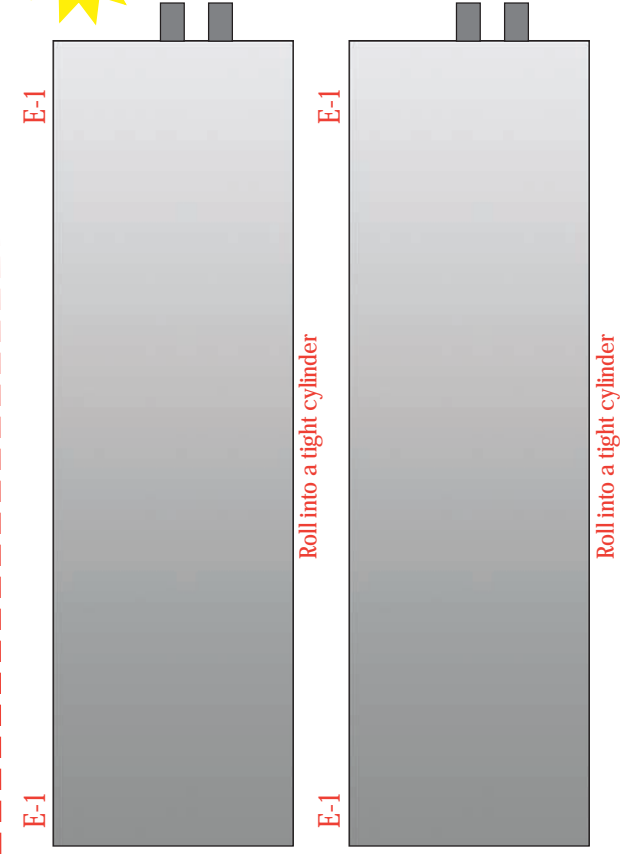
**D** IMPACT BOOM HOLDER



**G** STEREO BODY



**E** IMPACT BOOM



**F** S/WAVES ANTENNAS

