

# Lunar Librarian Newsletter

## June 2008

Vol. 3. Issue. 6



The High-Gain Antenna System (HGAS) is on the Orbiter! The HGAS provides communication between LRO and the scientists and engineers here on Earth. Also, the HGAS points a laser ranging telescope that we use to measure the distance between the Earth and the Orbiter to a precision of 10 cm. The HGAS team has put in long hours integrating and testing this subsystem in preparation for its final installation on the Orbiter.

Also, we're integrated our command and data handling box (C&DH). This box was removed previously for a modification to the Coarse Sun Sensor circuit. The box is back on the Orbiter and fully checked out. Today, we re-installed the solar array interface panel, closing out the avionics deck.

*To the right is the Orbiter with the HGAS installed. It is on the -Z face, with the avionics radiator on each side of it. Right now, the radiator is covered with an aluminum panel which protects the delicate mirrors from impact and contamination. You can see the close-out panel on the -Y face (left) where the solar array will attach. The solar array gimbal is at the bottom of the panel in the middle. The four array attach points are visible at the top corners and just below the middle of the panel. One of our two omnidirectional antennas is mounted on the boom at the top.*



The LRO team has been busy finishing all the details. We are checking out every heater and temperature sensor connection, shielding cables, tying harnesses down for flight, and installing blankets. We have run through tests of all of the electronics on the spacecraft, but we plan to do one more run for the record before we start environmental testing. The flight operations team executed several simulations over the last few weeks.



The Solar Array System has been assembled as a stand-alone subsystem. We successfully executed a full deployment on the test stand on May 20th (the same day the flight operations team simulated a deployment). We integrated the interface panel and solar array gimbal (the mechanism that controls the solar array) on the Orbiter and ran the gimbal through its paces. We also hooked the array up with extension cables and verified that light on the array properly sends current into the Orbiter.

*To the left, the avionics panel almost ready for final close-out. On the right, a technician measures the position and alignment of our instruments.*

To the right, Craig Tooley, the LRO project manager, describes the LRO mission to actor George Takei who played Mr. Sulu on the television show Star Trek. In the background, the LRO mechanical team prepares for some work on the Orbiter and the harness team takes a break. More pictures are available at:

[http://www.nasa.gov/centers/goddard/news/topstory/2008/takei\\_images.html](http://www.nasa.gov/centers/goddard/news/topstory/2008/takei_images.html)



Follow LRO's assembly progress at:

<http://lunar.gsfc.nasa.gov/hardware.html>

Are you following LRO and LCROSS on Twitter and Facebook? If not check out the following links:

- **LRO:**
  - Twitter: [http://twitter.com/LRO\\_NASA](http://twitter.com/LRO_NASA)
  - Facebook: <http://www.facebook.com/profile.php?id=1349462143>
- **LCROSS:**
  - Twitter: [http://twitter.com/LCROSS\\_NASA](http://twitter.com/LCROSS_NASA)
  - Facebook: <http://www.facebook.com/profile.php?id=1381982749>

## NASA News

### Over 1 MILLION People Are Having Their Name Sent to the Moon Aboard LRO!

On Friday, June 20, 2008, *Send your name to the Moon* program reached one million names. Other missions which have had similar programs have not come anywhere near 1,000,000 names.

So how did we do this? This answer lies within the LRO Education and Public Outreach lead, Stephanie Stockman.



“The outreach team has been using social media and web 2.0 for the past year, and when it was time to send your name to the moon, I promoted it on my personal blog and Twitter account,” Stockman said. “Send your name also was set up as group on Facebook, and video was posted on YouTube.

“It was on blogs all over the world. I am amazed that we can reach thousands of people in days and millions of people in weeks,” she added.

The names will be placed on a microchip that will be installed on the LRO spacecraft. The deadline for submitting names is **NOW July 25, 2008**. Send your name soon!! <http://www.nasa.gov/lro> ([http://www.nasa.gov/mission\\_pages/LRO/news/nametomoon2.html](http://www.nasa.gov/mission_pages/LRO/news/nametomoon2.html))

## GLAST, the Gamma-ray Large Area Space Telescope



### Cocooned Within

The first half of the payload fairing is moved into place around NASA's Gamma-Ray Large Area Space Telescope within the mobile service tower on Launch Pad 17-B at Cape Canaveral Air Force Station. The fairing is a molded structure that fits flush with the outside surface of the Delta II upper stage booster and forms an aerodynamically smooth nose cone, protecting the spacecraft during launch and ascent.

Photo credit: NASA/Jim Grossmann May 27, 2008

The Universe is a vast place holding a multitude of questions for scientists. NASA launched the Gamma-ray Large Area Space Telescope (GLAST) on June 11, 2008 to look into some of these questions dealing with gamma-ray radiation. Supermassive black holes, merging neutron stars, streams of hot gas moving close to the speed of light are just a few examples of different objects in the Universe that generate gamma-ray radiation.

The GLAST mission will provide new information to both the astrophysics and particle physics communities. GLAST is a collaborative partnership with the U.S. Department of Energy and from academic institutions and partners in France, Germany, Italy, Japan, Sweden, and the U.S.

GLAST's main mission objectives are:

- Explore the most extreme environments in the Universe, where nature harnesses energies far beyond anything possible on Earth.
- Search for signs of new laws of physics and what composes the mysterious Dark Matter.
- Explain how black holes accelerate immense jets of material to nearly light speed.
- Help crack the mysteries of the stupendously powerful explosions known as gamma-ray bursts.
- Answer long-standing questions across a broad range of topics, including solar flares, pulsars and the origin of cosmic rays.



GLAST consists of two instruments. The main instrument, the Large Area Telescope (LAT), will be detecting high-energy gamma rays from a variety of sources. With the use of LAT, scientists will try and determine if there are dim and distant quasars among the first galaxies to form in the Universe. LAT will also be used to “observe blazars and other black hole systems with particle jets to learn how these jets form.”

The second instrument is the GLAST Burst Monitor (GBM). This instrument will be observing gamma-ray bursts, the most powerful explosions in the Universe. These bursts are most likely remnants from the early Universe. Although these bursts are fairly common, on the order of one per day, they are random and brief occurrences (few milliseconds to about a minute in duration). “The leading theories state that gamma-ray bursts originate from massive “hypernova” explosions or from the mergers of black holes or neutron stars.” ([ftp://universe.sonoma.edu/pub/GLAST/glast\\_artwork\\_general/brochure/glastbroch08.pdf](ftp://universe.sonoma.edu/pub/GLAST/glast_artwork_general/brochure/glastbroch08.pdf))

For more information on GLAST, please see: <http://glast.gsfc.nasa.gov/>. Other images can be found at: [http://www.nasa.gov/mission\\_pages/GLAST/launch/gallery-index.html](http://www.nasa.gov/mission_pages/GLAST/launch/gallery-index.html)





Science as Process

# The Great Planet Debate

A Scientific Conference & Educator Workshop

For more information visit  
<http://gpd.jhuapl.edu>

**August 14–16, 2008**  
**The Johns Hopkins University**  
**Applied Physics Laboratory**  
**Laurel, MD**  
**Kossiakoff Center**

#### **Purpose**

To review what we have learned about planetary bodies, both inside and outside our Solar System, and to discuss and debate the criteria used to define and categorize planets, as a scientific process that is continually evolving.

#### **Educator Workshop**

An educator workshop on August 16th will provide a forum on how the planet debate can be used to spark scientific inquiry in the classroom.

#### **Sponsors**

National Aeronautics Space Administration  
The Johns Hopkins University Applied Physics Laboratory  
Planetary Science Institute  
American Astronautical Society



## Science News

NASA Science News has published several articles last month. Please follow the links to read the full stories. Check out our RSS feed at <http://science.nasa.gov/rss.xml>!

### **NASA Plans to Visit the Sun**

NASA has a daring new mission on the drawing board: Solar Probe Plus, a spacecraft tough enough to visit the sun itself. [http://science.nasa.gov/headlines/y2008/10jun\\_solarprobe.htm?list907815](http://science.nasa.gov/headlines/y2008/10jun_solarprobe.htm?list907815)

### **NASA's Newest Space Telescope Reaches Orbit**

NASA's Gamma-ray Large Area Space Telescope (GLAST for short) left Earth today onboard a Delta II rocket. "The entire GLAST Team is elated," reports program manager Kevin Grady of NASA's Goddard Space Flight Center. "The observatory is now on-orbit and all systems continue to operate as planned." Read today's Science@NASA story to learn about some of the exciting new science GLAST is expected to accomplish. [http://science.nasa.gov/headlines/y2008/11jun\\_glast2.htm?list907815](http://science.nasa.gov/headlines/y2008/11jun_glast2.htm?list907815)

### **Solstice Moon Illusion**

Sometimes you just can't believe your eyes. This week is one of those times. Check out the full Moon on June 18th and prepare to be deceived!

[http://science.nasa.gov/headlines/y2008/16jun\\_moonillusion.htm?list907815](http://science.nasa.gov/headlines/y2008/16jun_moonillusion.htm?list907815)

### **Apollo Relic Reveals its Secrets**

In 1967, Surveyor 3 landed on the Moon. Two years later, Apollo astronauts visited the little unmanned spacecraft and brought pieces of it home to Earth. Now, a portion of Surveyor's robotic arm, the scoop it used to sample moon dust, is teaching researchers some long-lost secrets.

[http://science.nasa.gov/headlines/y2008/20jun\\_apollorelic.htm?list907815](http://science.nasa.gov/headlines/y2008/20jun_apollorelic.htm?list907815)

## Librarian News



What activities do you have planned dealing with space and the Moon at your library this summer? Please feel free to share ideas, comments, and pictures.



## Links of the Month...

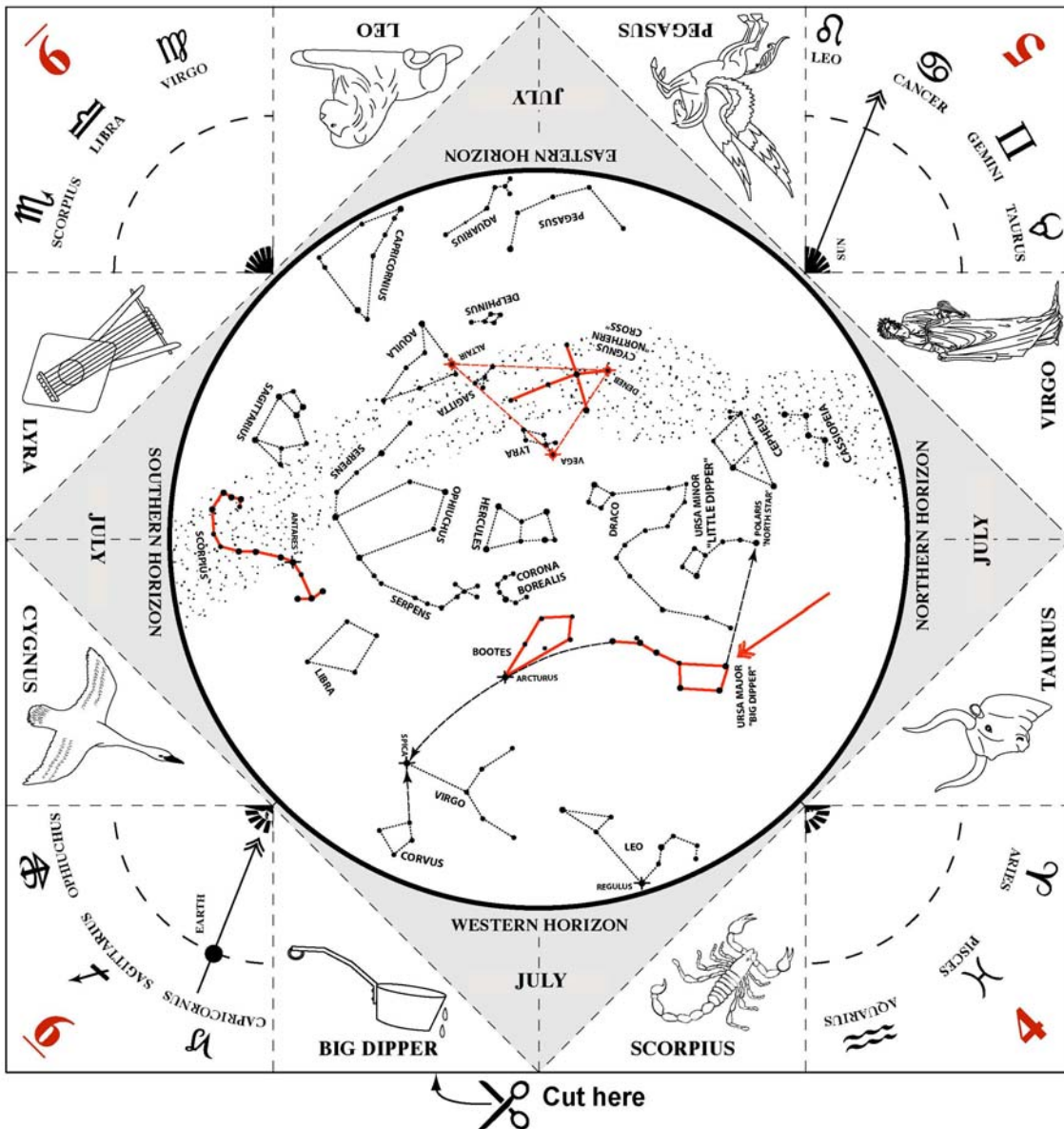
- For the International Polar Year, the Exploratorium gave polar scientists cameras and blogs and asked them to document their field work in real time. Follow along on their adventures and see what it's like to be a research scientist in the Arctic or Antarctica. <http://icestories.exploratorium.edu/dispatches/index.php>
- A new website showing how kids have made a difference. <http://kidsareheroes.com/>
- "Learning With Data," a new CDROM that provides all of the data, tools, activities, and background learning materials needed to implement data rich investigations into the theory of Plate Tectonics. Students select and plot earthquake, elevation, seafloor age, volcano, island age, and heat flow data, then assemble and annotate the plots for their interpretations. Inquiry activities and a wealth of animations and background material are included.  
Video Demo at: <http://learningwithdata.org/info/index.html>  
The main site is at: <http://learningwithdata.org/>
- Exploratorium: Faultline, Seismic Science at the Epicenter <http://www.exploratorium.edu/faultline/>
- 2009 International Year of Astronomy <http://astronomy2009.nasa.gov/> and <http://astronomy2009.us/>

# Monthly Activity

Make a Star Finder - <http://spaceplace.nasa.gov/en/kids/st6starfinder/st6starfinder.shtml>

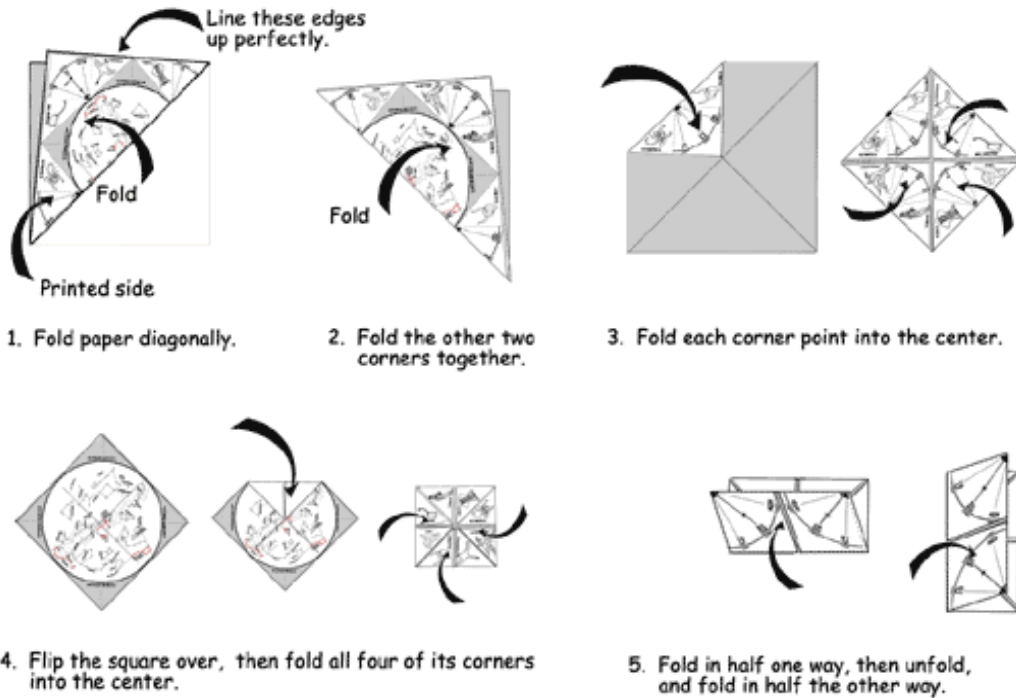
Make a Star Finder. Learn your way around the night sky by finding some of the constellations. The pattern for your Star Finder is included as an Adobe Acrobat file. Here is July's.

Color or decorate the Star Finder, if you like. Then cut it out on the solid lines.



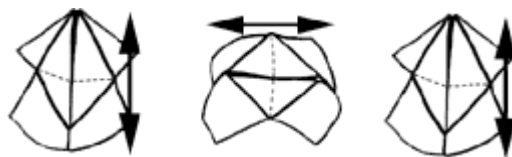


Fold it like this:



Play the Star Finder game:

1. Stick your thumbs and first two fingers into the four pockets on the bottom of the Star Finder.
2. Ask another person to choose one of the top four squares. Then, depending on the number on the square she chose, open and close the Star Finder that many times (open up and down, close, open side to side, close, etc.). For example, if she chose number 6, open and close the Star Finder 6 times.



3. Then, ask the person to look inside the Star Finder and pick one of the four visible constellations. This time, open and close the Star Finder once for each letter to spell out his choice. For example, if he chose "Lyra," you would open and close the Star Finder 4 times, once for each letter: L - Y - R - A.
4. Ask the player again to pick one of the four constellations visible. Open the panel to see the name of a constellation (highlighted in red) she will try to find in the sky for this month.

For some of the months, not every part of the Star Finder may show a highlighted constellation for you to find. In this case, just try to find the constellation that is nearest to the part of the sky you picked. Or, just find any constellation!