



A PongSat is an experiment that fits inside a ping pong ball. These ping pong ball “satellites” are flown to the edge of space by balloons or launched in sounding rockets. There are currently six to ten high-altitude missions flown by JP Aerospace each year. All of these missions can carry PongSats.

Purpose: Think big by thinking small! The PongSat program is designed to get students, researchers, engineers, and people everywhere directly involved in space.

The Process: *(How to get your PongSat to JPA)*

The PongSat program is completely free and open to everyone.

The first step is to contact JPA and let us know that you wish to participate in the PongSat program. E-mail is preferred; you can fill out the attached form and e-mail it to us. If a class or other group is involved please give us a single contact person to represent all the students/experimenters. Thirty days prior to the flight, a description of the PongSat must be received by JPA. This description can range from a simple sentence or list to a complex technical description depending on the complexity of the PongSat.

Each individual PongSat will be issued an ID number. The participant should write the number directly on their PongSat.

PongSat™ is a program of:



J P A E R O S P A C E

America's OTHER Space Program

2530 Mercantile Dr. Suite I, Rancho Cordova, CA 95742
web site <http://www.jpaaerospace.com> (916) 858- 0185

JPA will schedule a flight for the PongSats. Groups will have their PongSats flown together. PongSat flights are on a first come first serve basis. When a PongSat is manifested for a flight the participant will receive an email mission briefing.

A PongSat must be received by us for a specific flight at least six days prior to the flight.

After the end of the flight the PongSats will be mailed back to the Participant along with mission data from the flight.

We are always surprised by the amazing variety and sophistication of the experiments that can take advantage of such a small space. The experiments range from plant seeds to complete upper atmosphere labs with over a dozen sensors and a data logger. PongSats have been used for both basic science inspiration and literacy and for university class research

PongSat Requirements/Restrictions

No insects or other animals

Anything that sticks out of a PongSat must be preapproved

No volatile chemicals

No combustion

Not heavier than 3 oz.

Any device that emits a radio signal must be preapproved

All PongSats are subject to inspection

Some Ideas for Experiments

What can you do inside something as small as a table tennis ball? Plenty!
Here are just a few ideas:

Plant seeds: compare the growth of plants grown from seeds flown at the edge of space with those seeds left behind.

Would a Bubble Wrap® bubble pop? Is the drop in pressure enough to do the job?

Small electronics

Film cosmic ray experiment: undeveloped camera film will often contain white streaks when developed after being exposed to cosmic rays at high altitude

Wet sponge: would the water in a wet sponge boil off due to the lack of pressure?

Use two PongSats, one to “beep” and the other to listen

Put a mini-marshmallow in and see if it expands

Get two matching inexpensive digital clocks (the type found in \$2 to \$6 dollar watches). Put one watch in the PongSat. Use the other as a control. After the flight, compare the time on clocks. See if the cold temperature affected the clock

Stamp computer-controlled wind flow measurement

Paper that changes color with temperature

PongCam

Solar power battery charging: charge a small battery with a small solar panel

Is an MP3 strip affected by the cosmic ray strikes at 100,000 feet?

Temperature measurement

Pressure measurement

“Before and after” bounce test

Examples of PongSats



Inside PongSats



Pongsat may have power on switches.

The Environment at High Altitude



PongSats at the edge of space

The PongSat will be exposed to temperatures down to 130 below zero Celsius. At peak altitude, near vacuum conditions exist. Cosmic rays will occasionally strike at 100,000 feet. The environment nearly simulates that found in space.

The air pressure is only 1/100 of that at sea level. This near vacuum pressure has dramatic effects on materials.

The Carriers: *(The vehicles that carry the PongSats)*

High Rack

The High Rack is our shelf at the edge of space. It consists of a set of foam and carbon shelves that is carried by balloon to 100,000 feet. A High Rack can carry 500 PongSats.



PongSat Launcher Rocket

The PongSat Launcher (PL) rocket is 89 inches long and three inches in diameter. It utilizes a phenolic airframe with a Kevlar nosecone. It is powered by a off-the-shelf, reloadable solid rocket motor. The rocket can use motors from 1,200 to 8,000 newton/sec of total impulse.

We launch the PL rocket from the ground and from balloons and airships. Ground launches reach from 10,000 to 30,000 feet. Balloon and airship launches reach 63 miles.



The PongSat Launcher Rocket can carry up to 20 PongSats.

How to Cut a Table Tennis Ball in Half

At this time all participants must provide their own table tennis balls which they will use for their PongSats. Here are some of our considerations for cutting them in half to put the experiment inside. ***Warning: knives, razors not recommended; this task should be performed by an adult or under adult supervision; use caution, injuries to hands possible; edges of cut balls will be sharp.***

1. Find the seam. This is where the halves of the ball were originally glued together.
2. Use a felt tip marker and place a dot on the seam (this will be your reference to put the ball back together).
3. Using a fine hack saw blade slowly saw around the line.
4. Two passes around the seam should cut through the ball.

How to Put the Ball Back Together

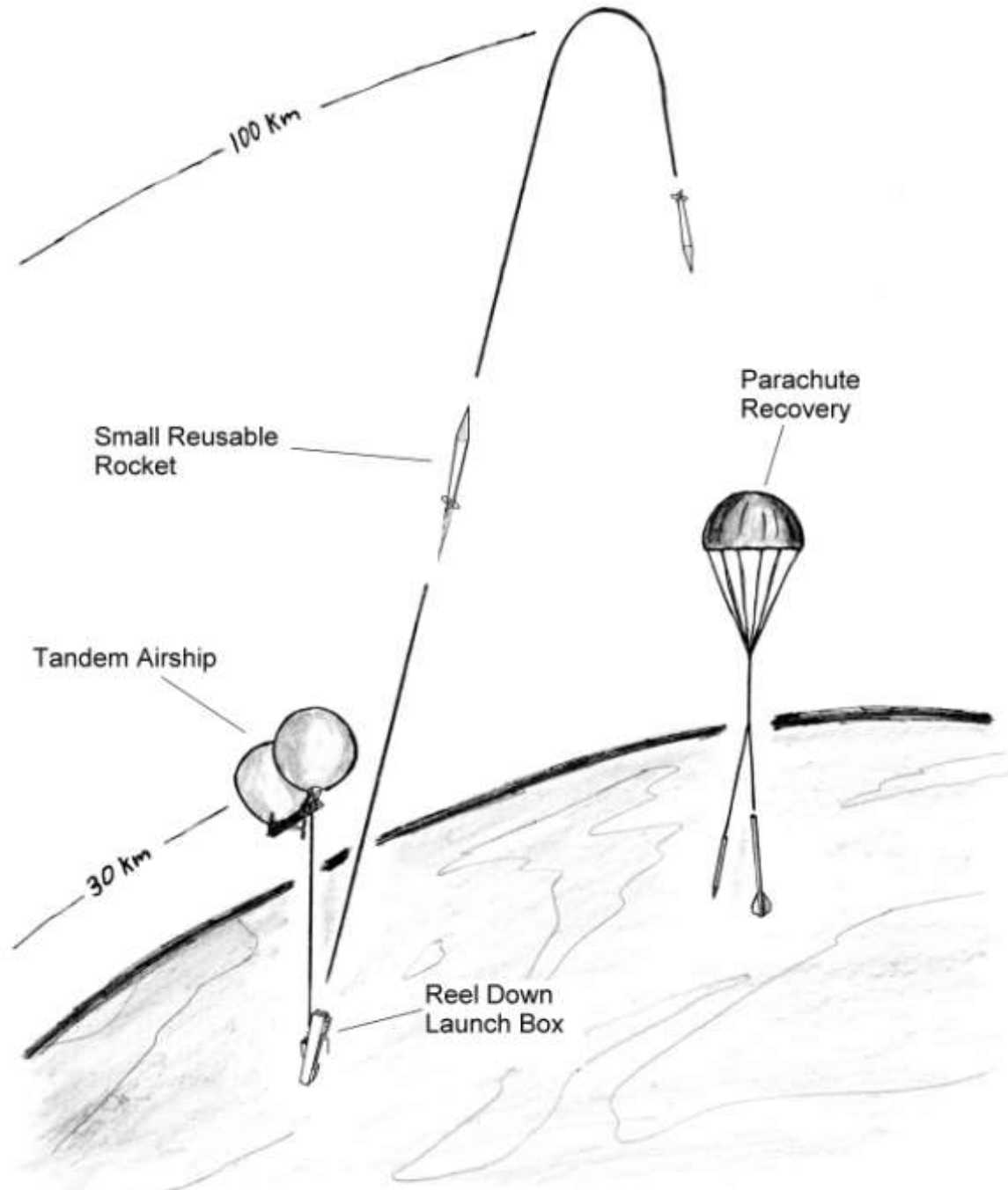
A single wrap of any type of tape is sufficient to hold the ball together for the flight.

After the Flight

The PongSats will be returned to the participants by mail. Detailed information about the flight will be included. Each participant will receive a certificate to show they traveled to the edge of space.

What's Next?

In the years ahead we will be able to take PongSats all the way to space.



PongSat Launch System

Resources

PongSat Web Site

<http://www.jpaaerospace.com/pongsat>

Send us your PongSat photo and we'll post it on the official web site.

JP Aerospace Web Site

www.jpaaerospace.com

Look here for information on the PongSat carriers.

Parallax Computers

www.parallaxinc.com

Parallax makes the BASIC Stamp computers. Their Basic Stamp 1 is easy to use and fits inside a table tennis ball.



Misc.

Pong Sat traditions: All participants should sign their PongSat.

PongSat classes and teams can create "mission patch" designs for their flight. Any mission patch designed by participants can be displayed on the side of the launch vehicle (design subject to JPA approval)

PongSats are often flown on research and development missions. Sometimes unplanned things happened and vehicles are lost. In this event, JPA will "re-fly" a new PongSat for the participant. JP Aerospace is not responsible for the loss of a PongSat during missions.

We love hearing about ideas for PongSats. Let us know your ideas and we'll pass them along. Check for updates and the latest information at www.jpaaerospace.com, click on PongSat

Good luck, have fun, and explore the universe!

John Powell
President
JPAerospace, America's OTHER Space Program

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PongSat Registration Form: Individual

Name of Participant: _____

Address: _____

Phone Number _____

E-mail _____

PongSat Registration Form: Group

Name of Group _____

Type of Group _____

Number of PongSats _____

Age of Participants _____

Name of Contract: _____

Address: _____

Phone Number _____

E-mail _____