



A PongSat is an experiment that fits inside of a ping pong ball. These ping pong balls 'satellites' are flown to the edge of space by balloons or launched in sounding rockets. There are 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 to be directly involved in space.

Cost: PongSats are flown at no cost to the participant.

The Process: *How to get your PongSat to JPA.*

The first step is to contact JPA and let us know that you wish to participate in the PongSat program. E-mail is best. You can fill out the attached form and fax it to us or e-mail us the form's information. 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 paragraph to a complex technical description depending on the complexity of the PongSat.

Each individual PongSat will be given 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.jp aerospace.com> (916) 858- 0185

JPA will schedule a flight for the PongSat. 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 a mission briefing data sheet about the flight.

A PongSat must be received 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.

PongSat Flight opportunities

PongSats on high altitude balloon flights (contained).

The PongSats are carried in a lightweight box that exposes them to the environment. A majority of PongSats are flown in this manner.

PongSats on high altitude balloon flights (exterior).

PongSats can be mounted outside on the structure of the balloon platform. This can be useful for solar panels and antennas. Space is extremely limited with only one or two exterior mounted PongSats on each flight.

PongSats on rocket flights

There is space for thirty to sixty PongSats on rocket flights throughout the year.

PongSat Requirements

No insects or other animals.

Anything that sticks out of a PongSat must be preapproved.

No volatile chemicals.

No combustion

No heavier than 3 oz

Any device that emits a radio signal must be preapproved.

Any liquids must be carefully contained.

Experiments Ideas

What can you do inside something as small ping pong 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 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 be exposed to cosmic rays at high altitude.

Wet sponge. Would the water in a wet sponge boil off due to the lack of pressure.

Two PongSats, beeps and the other listens. Sound can be used to determine altitude.

Put a mini-marshmallow in and see it expand.

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

Stamp computer controlled wind flow measurement.

Paper that changes color with temperature.

Pong-Cam

Solar power battery charging. Charge a small battery with a small solar panel.

Does an MP3 strip effected by the cosmic ray strikes at 100,000 feet?

Temperature Measurement

Pressure Measurement

Before and after bounce test

The Environment at High Altitude.

The PongSat will be exposed to temperature down to 180 below zero. At peak altitude near vacuum conditions exist. Cosmic rays will occasionally strike at 100,000 feet. The environment nearly simulates that found in space.

Delays

Missions that carry PongSats can be delayed for a variety of reasons. The biggest cause of delay is usually the weather. Keep in mind potential delays. Delays can especially impact school PongSat program that are close to the end of a school year.

Failed Missions or the Lost of PongSats

So far no PongSat has every been lost, however the possibility exists with every mission. Risk is a part of every space program. Failure can range from the crash of a rocket, to failure to reach the desired altitude on balloon, to a package flying 2000 miles out over the Pacific ocean. If a mission has failed every effort will be made to fly the participants new PongSats as soon as possible.

Shipping

We have found that during shipping the PongSats to JP Aerospace PongSats will experience more hardships than found in space travel. Please pack your PongSats securely.

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. In addition to carrying out experiments, High Racks are used to test equipment for other high altitude vehicles.

A High Rack can carry up to 300 PongSats.



The large fins on this High Rack help stabilize the vehicle during the climb and descent.



This High Rack was flown horizontally to accommodate a two meter propeller for a high altitude test.

Dark Sky Station



The Dark Sky Station (DSS) is a high altitude balloon platform. It carries equipment and instrumentation to 100,000 feet. The DSS can also serve as a launch platform for rockets heading to space.

The DSS consists of a five-arm truss structure. The arms radiate out from the center like a starfish. The platform is carried aloft by ten high altitude helium balloons attached to the trusses. In the center is a deck that carries the flight systems. The DSS carries two command/control systems, a backup abort system, five fly-by-wire balloon release systems, three GPS's, drogue and main parachute cannons, high and low power radio beacons, live video downlink, recording video, audio beacon and two 35mm cameras.

There are two different sizes of Dark Sky Stations. One twenty-seven feet in diameter and the other fifty-two feet in diameter. Dark Sky Stations can carry up to 600 PongSats

MicroSat Launcher Rocket (ML)



The ML is a twelve foot long solid propellant rocket. An ML launch can carry 5 to 20 PongSats depending on the mission requirements.

How to cut a table tennis ball in half.

There are many ways of cutting a ping pong ball in half. However some ways are easier than others. We have found the using a knife results in too many cut fingers.

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 clear 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 “Been There” certificate to show they traveled to the edge of space.

Miscellaneous

PongSat traditions: All participants should sign their PongSat.

Any mission patch designed by participants can be displayed on the side of the launch vehicle.

PongSat classes and teams can create ‘mission patch’ designs for their flight.

PongSat Tee Shirts will be available for sale on the PongSat.com website.

PongSat 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 lost of a PongSat during missions.

This users guide can be freely reproduced as long as it is not altered.

We love hearing about ideas for PongSats. Let us know your ideas and we'll pass them along.

JP Aerospace reserves the right to refuse flight of any PongSat for safety or any other reason.

Good luck, have fun, explore the universe.

John Powell
President
JP Aerospace, America's OTHER Space Program

Resources

PongSat web site

<http://www.pongsat.com>

Send us your PongSat photo and we'll post it on official web site. Watch this site for flight opportunities.

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.

Mondotronics

www.RobotStore.com

The Robot Store catalog carries countless parts, pieces and components that are perfect for use in PongSats.



View from a PongSat with the planet Venus in the background.



PongSats on a High Rack.



PongSats before a launch.



PongSats carried aloft.



PongSats!

PongSat Registration Form: Individual

Name of Participant: _____

Address: _____

Phone Number _____

E-mail _____

Type of PongSat flight Desired (Circle One)

High Altitude Balloon

Medium Altitude Rocket

Flight Schedule Desired (Circle One)

Fall 2003

Winter 2003

Spring 2004

Summer 2004

PongSat Registration Form: Group

Name of Group _____

Type of Group _____

Number of PongSats _____

Age of Participants _____

Name of Contract: _____

Address: _____

Phone Number _____

E-mail _____

Type of PongSat flight Desired (Circle One)

High Altitude Balloon

Medium Altitude Rocket

Flight Schedule Desired (Circle One)

Fall 2003

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