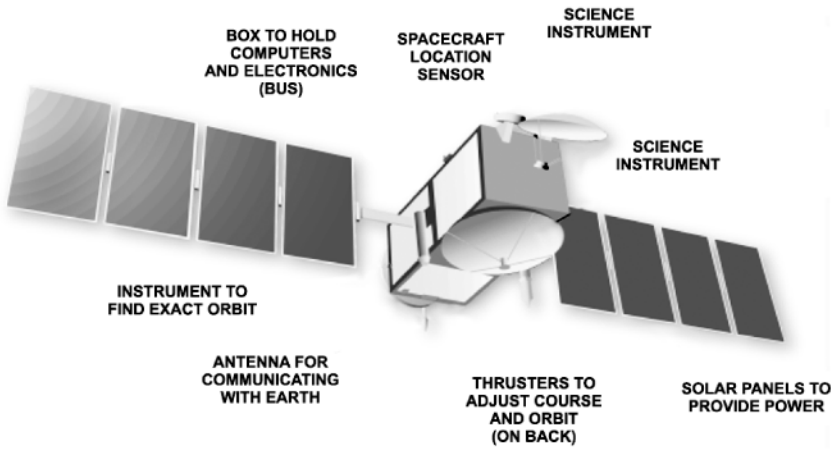
Activity: Build Your Own Jason-1 Spacecraft



Jason-1 has a lot of work to do! Here are some of its tasks:

- Measure changes in ocean circulation that affect our climate and weather.
- Forecast El Niño and La Niña events.
- Provide information on ocean currents to container ships, cable-laying ships, and racing yachts.
- Provide information to help predict wind strengths of hurricanes.
- Measure changes in sea levels (part of the effort to understand global changes).
- Help marine scientists understand ocean habitats and locations preferred by whales and other marine organisms.

Most spacecraft that orbit Earth (also known as satellites) have some things in common. Like Jason-1, most have a "bus" that contains the computer and electronics, a source of power, instruments to gather science information, communications antennas, small rockets called thrusters (for moving the spacecraft), and equipment for accurately locating the spacecraft. There are many other parts, but these are some of the basic ones.

Materials to Build Your Model Jason-1:

1 juice box (spacecraft bus)
1 Popsicle stick or a chopstick (solar panels)
Aluminum foil or other shiny paper (covering for solar arrays and the bus)
Egg carton (for antennas)
Fishing line or string (to hang satellite in space)
2 cotton swabs (for the Global Positioning system and other antennas)
4 push pins (thrusters on the bus)
Duct tape, transparent tape, or adhesive poster tac for attaching parts
Stiff paper (solar panels)
Scissors

Note: Other materials may be used to make a more realistic-looking model.

Instructions:

Note: As you construct your model, use the picture of Jason-1 as a guide.

1. Wrap an empty juice box (your spacecraft's bus) with aluminum foil or some other reflective material. This wrapping represents the space blanket that keeps the spacecraft warm.
2. Make small slits in the middle of the narrow sides of the empty juice container. Slide a Popsicle stick through the box so it sticks out equally on each side.
3. Tape a small piece of stiff paper about 5 centimeters (2 inches) wide by 7.5 centimeters (3 inches) long to each end of the Popsicle stick. Color the paper with crayons or cover the paper with foil to represent the spacecraft's solar arrays.

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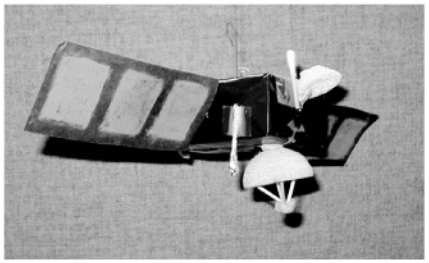
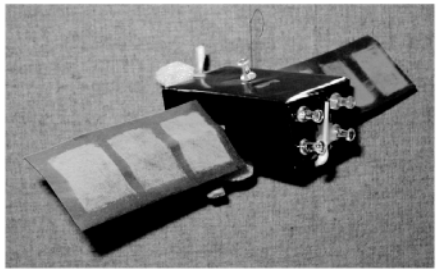
Activity: Build Your Own Jason-1 Spacecraft (cont'd)



On this model of the Jason-1 spacecraft, foil gift wrap was used to wrap the "bus," solar panels are constructed of paper colored with black and blue crayon,



and the altimeter and radiometer are made of carved-out Styrofoam balls. The thrusters are push pins.

4. Cut out two cups from an egg carton. One cup will represent the altimeter and the other will represent the radiometer of the spacecraft. Using a small piece of silver duct tape or poster tac, attach the bottom of one of the cups to the bus on a surface between the solar panels, so that the inside of the cup faces outwards (Earthwards). This cup represents the altimeter.

5. Cut around the edge of the other cup so that it is smaller in diameter than the altimeter. This cup represents the radiometer. Tape or poster tac the side of the *radiometer* to one end of the bus so that it faces the same direction as the *altimeter*.

6. Cut one cotton swab in half and tape one piece on the end of the bus with the radiometer. This half of the cotton swab should point in the opposite direction from that of the altimeter and radiometer. This represents the *turbo rogue space receiver*.

7. Wrap the other half of the cotton swab in foil and attach it on a side of the bus near a solar panel, so that the end sticks out by the altimeter antenna. This half of the cotton swab represents the laser retroreflector array, which helps pinpoint the location of the spacecraft. (Knowing the exact location of the spacecraft is very important in order to measure the height of the ocean to within 5 centimeters—about the length of your little finger.)

8. Insert four push pins (at each corner of a square) into the end of the bus opposite the radiometer. These pins represent the thrusters—tiny rockets that are used to make small changes in the orbit of the spacecraft.

9. Cut another cotton swab in half and tape one piece on the end of the bus where the thrusters are located. The end of the cotton swab should stick out about one-half centimeter (1/4 inch) on the side with the altimeter, and the cotton swab should be pointed in the same direction as the altimeter. This piece of the cotton swab represents the radio receiver, which not only receives commands, but also transmits data back to Earth.

10. Attach fishing line to the model spacecraft, so you can hang it on display, or you can swing your spacecraft into orbit around a globe of Earth!

Topics for discussion:

- The role of satellites as "eyes in the sky," gathering data that are difficult for us to gather on Earth.
- The orbit of a satellite around Earth to collect a complete picture, made up of "strips" of data over a number of days.
- Types of measurements that can be made, for instance sea-surface height, ocean color, sea-surface temperature, winds over the ocean. The use of these measurements to improve human welfare and safety.