INSTRUCTIONS FOR STEREO/WAVES MODEL

Purpose:

This document will guide you step by step on how to construct you own STEREO model. The model includes an integrated radio that simulates the instrument S/WAVES on the real STEREO spacecraft.

Build your own STEREO model!

Objectives:

a) to demonstrate how radio waves are received by the S/WAVES instrument on the STEREO spacecraft.

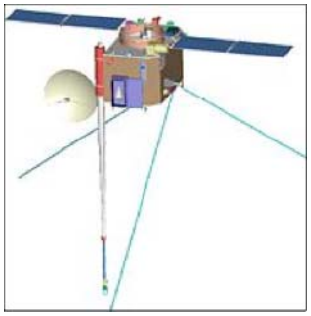
b) to identify the basic components of radio reception.

Tools needed:

- Drill and drill bits
- Wire strippers
- Soldering gun/iron and solder
- Small Phillips-head Screwdriver
- Diagonal cutters

Optional helpful tools:

- Needle-nose pliers



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Materials needed:

- Project enclosure (7x5x3") – Radio Shack item #270-1807
- 2 VHF dipole antennas – Radio Shack item #15-236
- Grundig Mini 300 AM/FM/SW Pocket Radio – Radio Shack Item #20-115
- 2 AA batteries
- 22AWG wire – around 6 feet needed – possible Radio Shack Item #278-1224 or #278-1221
- Switch – Radio Shack Item #275-692
- Electrical Tape
- Zip tie (?)
- Tape
- STEREO paper model – sized for 7x5x3" enclosure (on website)

**click here if you need to see pictures of the radio shack items*

Preliminary steps:

Before starting the assembling process, it is necessary to detach the dipole (rabbit-ear) antennas first. It is a simple process. To do this, simply use a Phillips head screwdriver to remove the screw holding the antenna to the plastic base. Once this is removed, the antenna should come out. Repeat this process until you have 3 single antennas.

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Assembly procedures

1. Drill 3 holes in the top plate, large enough to fit the antennas. See layout in picture (approximately 1/2" square from 2 corners, ½" in from edge on center). Note that the antenna needs to be able to fit in at an angle, requiring a larger hole.

2. Inset 3 antennas into holes. Use wire or string to attach ends of antenna together.

3. Take off the battery cover of the radio. Notice the two screws here which hold the back cover of the radio on.
4. Open up the radio (3 screws on back) and take off the back cover.
5. Detach the brown wire from the antenna inside the radio. Use the diagonal cutters to do this.

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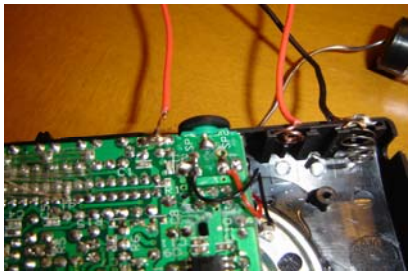
6. Strip one end of a long piece of wire. Solder this wire onto the spot where the antenna was attached. Be careful not to burn yourself, and also be careful not to let the solder or wire touch any of the other metal pieces on the green electrical board. Put electrical tape over any excess wire that is stripped.
7. Use diagonal cutters to cut a small chunk from the middle of the battery connector. Be careful not to lose either of the coils.
8. Cut two long wires, preferably from different color wire. Strip one end of each wire. Solder these wires onto the battery coils, and put the coils back in the radio. Make sure the two coils do not touch each other.



9. Replace the back plate of the radio and insert the three screws again.

10. Use a zip tie and a small piece of paper clip (or alternative) to make sure the power button on the radio is held down. We are creating a switch on the outside of the box for easier use.

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11. Drill a 3/4” hole on one of the small sides of the plastic enclosure. Insert the switch into this hole, and screw in the attachment that comes with the switch (a small black nut).

12. Solder the 2 power wires (the ones attached to the battery coils) to the two silver prongs of the switch. Put electrical tape over each prong.

13. Solder the antenna wire to one of the three antennae. You can choose which one you want to wire to.

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14. Put the radio in the appropriate setting (AM)
15. Attach the top of the enclosure to the base using the screws provided.

16. Print the STEREO paper model and use tape to secure this to the box.

Your model is completed! You can now use it to pick up radio signals like the S/WAVES instrument is able to. Extent the antennas – on real spacecraft, the antennas are always much bigger than the spacecraft body also!