



# Spark Gap Directed Inquiry Activity

Name :

Date:

Purpose: To construct a spark gap transmitter capable of transmitting Morse code messages.

## Materials

Materials per group

- Wooden board, approximately 12" x 12"
- 3" x 1" x 1" block of wood
- Strip of 3" to 5" bendable metal (or a can lid)
- Another strip of bendable metal, 1 inch long. Could be substituted with a large metal paper clip.
- Magnet wire (at least 10 meters)
- 2 iron screws, 3" long
- 3 small screws
- 9-Volt battery
- 2 alligator clip electrical jumper cables
- Screwdriver
- Wood glue
- Sandpaper
- (Duct tape can also be useful)

Additional materials

- RTL-SDR dongle kit (one teacher's kit would be sufficient) and a computer with preloaded software.
- Alternative: use an AM radio receiver.



# Procedures

1. You just saw a video on constructing a spark gap transmitter. Looking at the materials on the desk in front of you, how do you think you could create a device that is capable of sending Morse Code? Create your plan in the space below. This is an individual activity, you will have time to collaborate with your peers later.

2. When directed discuss your ideas with your teammates. Don't change anything on your plan yet, just listen for how their ideas are similar and different to yours. Once you have all had the chance to share your ideas, create a list of how all the plans were the same. Also, create a list of the major differences you noticed. You can do that in the space below.

3. Now work together to create a first draft of your plan. You will not agree on every element that is where compromise comes into play. You may get your way on certain elements while another group member just saw a video on their own. Some of their ideas are dismissed entirely. Everyone should try to have at least one idea that nobody else has. Create your group plan on a separate piece of paper.

4. You are still not ready to build your transmitter. You have a good starting place now it is time to seek the advice of other experts. Each person in your group is going to find a web page or a YouTube video that focuses on Spark Gap Transmitters. It is important to find a source different from the one your teacher shared during class. It is also important that each person in the group is using a different source so share what you are using before you get started in the activity. You are NOT going to change your plan to look like the one you find. Instead you need to compare your plan to the one you find and see how they are different from one another. For each difference you find ask yourself, does their idea make more sense than our idea. If so why and if not why not. List all the differences in the space below.

5. Now go back and discuss your findings with your group. Decide as a group what changes you should make to your design. Once you are finished take it to the teacher for approval. If they approve they will sign your paper. If they don't sign you need to make changes until your design is approved. After your design is approved you may start building. Be sure to follow all the safety guidelines given by the teacher. You will not receive your battery until your design is complete. Once complete, raise your hand and the teacher will come over. If they approve you will get your battery.

6. Test your device. Use the testing station to see if your spark gap transmitter emits a signal that can be detected by the RTL-SDR dongle. If the device doesn't pick up the emission from your transmitter go back to your station and make changes to your design.

7. Take your changes to the teacher for approval. The teacher should sign your paper a second time before you make the changes and test again.

8. Send your first Morse code message and ask your classmates to decode it.

