

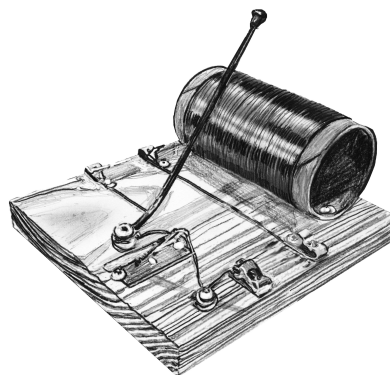
8 BUILD A WORLD WAR II FOXHOLE RADIO

It's not quite an iPod, but in the field it will make you feel very civilized!

Believe it or not, it's easy to build a working radio that doesn't use electricity in less than an hour. Offering instant gratification, World War II foxhole radios are simple, ingenious gizmos that reflect sound moving through airwaves. Best of all is the pleasure of listening to music under starry skies on an apparatus you built!

I did this project with my uncle, Dr. Richard Lanza, a nuclear engineer at MIT's Nuclear Engineering Department. Rolling out antennae wire attached to a toilet paper roll in the halls of one of the most prestigious institutions was beyond comical. Oddly enough, many of the scientists who walked by smiled and made comments like, "I remember making one of those when I was a kid." Who knows—making this radio could be your first step toward MIT.

During World War II, GIs were often isolated from hearing the day-to-day news of what was happening beyond their barracks. A few clever radio-deprived GIs figured out that they could use miscellaneous scrap metal and junk to construct a simple radio. Word spread, and soon scores of soldiers were creating their own radios. Amazingly enough, these radios did not require electricity or any other power source. Here is a chance for you to take a step back in history.



Making a World War II Foxhole Radio

GEAR LIST

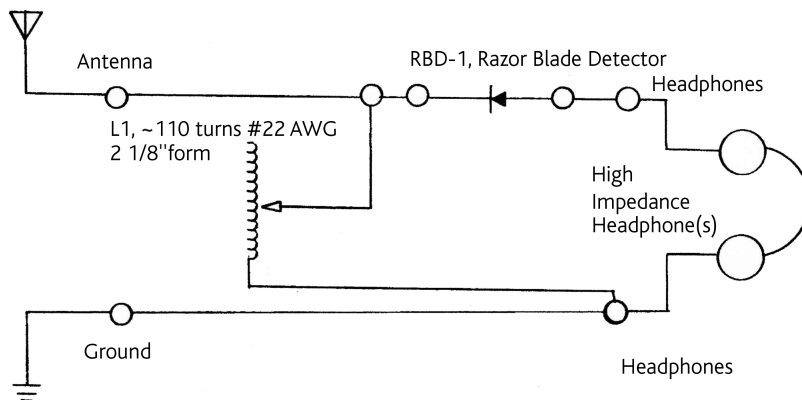
- Vintage-style fahnestock clips or paper clips
- 10 wood screws or thumb tacks
- 10 washers for the screws
- Needle-nose pliers
- Wire hanger
- Wooden board (a 1/2-inch-thick pine board is best)
- Coil form (you can use a cardboard toilet paper roll that's at least 1³/₄ inches in diameter—2 inches is best)
- Number 2 lead pencil
- Single-edge safety razor (preferably "blued"; see step 13)
- Geranium diode—1N34A (from Radio Shack), optional
- 40 feet of #22 AWG coil or magnet wire
- 1 foot of #26 wire
- 100 feet of antenna wire or an antenna kit
- Sand paper
- Crystal earphone
- Safety pin
- Screw driver
- Spray lacquer

STEP 1: Cut the wooden board to which your radio will be attached. The exact size is irrelevant, but it should be at least 6×6 inches to accommodate all the parts.

STEP 2: Create coil form. This is the tube around which you are going to wrap about 40 feet of copper wire. A toilet paper role will do, but it might be a bit flimsy. If you can get your hands on thicker tubing, such as the type used for gift wrapping paper, it will be more solid. In my set I used a 4-inch wide tube.

STEP 3: Punch four tiny holes in the tube. The two holes at each end should be about 1/2 inch from the end and about 1/4 inch apart. The two holes on each end should run width-wise to the ends. (See illustration on page 65.)

STEP 4: Wind the wire tightly around the coil form. This may be accomplished in many ways, but ultimately wrapping it by hand is best. It is very important that the coils be wrapped neatly next to each other.



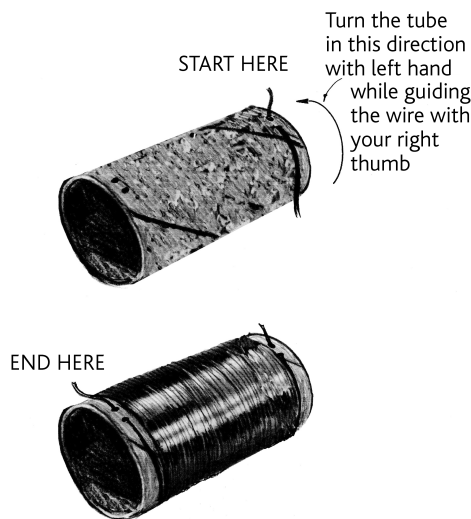
SCHEMATIC

Allow for about 6 inches of excess wire on the right side of the tube. I used magnet wire, which is a copper or aluminum wire covered with thin insulation. If you go to a place like Radio Shack, ask for #22 AWG (American Wire Gauge). It should be between 100 and 125 turns.

STEP 5: Tighten the coil manually by gripping it between both hands and rotating your hands in opposite directions.

STEP 6: Spray the coil with lacquer to help keep the form wrapped tight. Allow it to dry.

STEP 7: Attach the coil to the board. Use either two thumb tacks or two small screws. The excess coil wire should protrude from the front side of the tube, closer to the board, rather than from the top of the tube (see illustration).



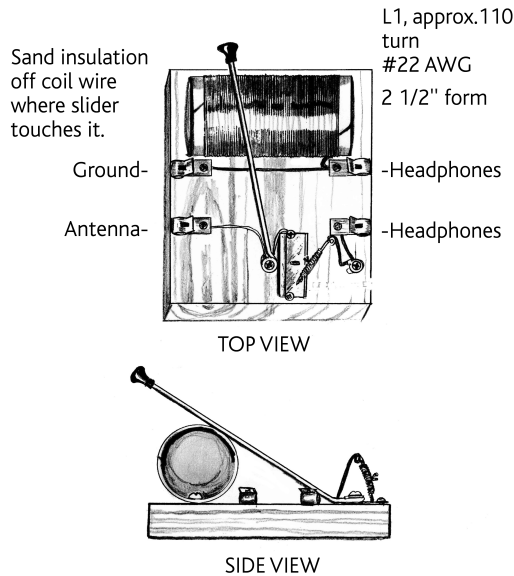
COILING THE TUBE

STEP 8: Attach four wire clips to the board—two on each side of the board below the coil. They should be about 4½ inches apart from each other width-wise along the coil and about 1½ inches

apart from each other on each side of the board (see illustration). The top clips should be about an inch below the coil.

TIP: You can substitute paper clips for the clips and thumb tacks for the screws. The idea is to be as innovative as the GIs in the field!

STEP 9: Make the tuner slider by cutting 7 or 8 inches of wire from a wire coat hanger. If the hanger has any type of coating on it such as paint, lightly sand it to improve contact points and reception.



STEP 10: Using needle-nose pliers, bend a loop around the bottom end of the tuner slider. This loop will be wrapped around a screw and washer, so bend it accordingly. You may want to attach a knob or ball of tape at the top end of the slider as this is where your fingers will move the slide later for tuning. About 3 inches below the coil, in the middle of the board, attach the slider to the board by placing it on top of two washers. Then screw it to the board firmly but not so tight that it inhibits the movement of the slider. The hook-up wires should go under the washers for all contact points. (See illustration.)

STEP 11: Attach the safety pin, which will be the detector contact, to a 2-inch piece of bare lead by bending the pin open about 90 degrees (on the clasp side—see illustration) and wrapping the pin side with #26 wire. Sharpen the end of the lead with a razor.

STEP 12: Attach the safety pin to the board, using a washer and screw,

in the lower right-hand corner. Attach a wire between the safety pin head and board with a washer and screw and wrap wire to the lower right clip, which will ultimately be one of the headphone attachments clips. The tip of the lead will ultimately come in contact with the side of the razor. (See illustration.)

STEP 13: Attach the razor blade, which will act as the radio's crystal. If you use a standard single-edged razor, it will need to be "blued" or heat treated. To do this, attach it to some pliers in a vise and heat it with a torch. (If you don't have a torch, you can purchase one that's ready to go from a hobby shop.) Bend the safety pin so that the tip touches the razor's surface.

FYI *During World War II, standard-issue razors were blued because they remained sharper longer.*

The crystal is the trickiest and most important part of this set. If you want better reception, you might consider purchasing a Germanium crystal detector from Radio Shack or from a radio hobby store like Borden's (Borden Radio Company, 138911 Kensington Place, Houston, TX, 77034, www.xtalan.com).

I found that it was easier to work out the kinks in my set by using the crystal detector before trying out the razor blade crystal.

STEP 14: Attach the rest of the wires according to the illustration. If any of the connections or contact surfaces are lacquered or painted, sand them lightly.

STEP 15: Attach a long wire to use as an antenna to the lower-left clip. The longer and higher, the better—use between 50 and 100 feet of wire of any type. Radio Shack sells some really great antenna kits for very little money. I have found that it works fairly well to attach the antenna high up on a tree.

TIP: If you want it really high, attach a weight and toss one end as high up in the tree as possible.

Your radio must have a ground wire. Plumbing pipes work as do flag poles. Experiment with different metal contacts. Attach the ground wire to upper-left clip.

You are now ready to operate your foxhole radio! Don't be frustrated if it does not immediately work. I found that I had to experiment a lot with gently moving the tuning slider back and forth along

the coil. The antenna and grounding wires made a big difference in how they were placed and how well they were connected.

I remember the first time I actually heard an AM station being tuned in. It was a bit of a mind-blowing experience listening to a radio on a device with no electrical parts.

I felt like I was listening to the propaganda DJs Tokyo Rose or Axis Sally as the GIs did during World War II. It was the most fun I have ever had with a radio. Enjoy listening to your new set.

