

# Tapped Coil Crystal Set

**T**HIS easily constructed crystal receiver which uses few parts, needs no power supply, has a minimum of adjustments, and will give clear reception over a limited area. It is designed to give maximum selectivity in metropolitan areas where several high-powered radio stations may be found. Where *selectivity* is not necessary, you can adjust this set to provide maximum *sensitivity* by placing extra taps on the secondary winding while constructing the coil, as we will explain later.

The receiver may be mounted on a board  $4\frac{1}{2}$  by 6 in. or it may be placed with the earphones in a cigar box for easy carrying. Before beginning construction, carefully examine both schematic and pictorial diagrams. It's wise for beginners to work with the pictorial diagram while doing the actual construction, as it shows positions and identities of each part, wire and connection. Then, as construction progresses, they should check



Want to try a receiver with fixed crystal detectors?  
Here is a selective circuit with few components

By MILO ADLER



The crystal set is shown above mounted in the cigar box with headphones in place beside it.

with the schematic in order to become familiar with the symbols used and to better understand the actual workings of the circuit and its operating principles. When you can follow more complex circuits, and the symbols, part functions, and wiring procedure are completely familiar, you only need the schematic as a guide.

First drill two holes for mounting the coil  $\frac{3}{8}$  in. from each end of the coil form and just large enough to pass the  $\frac{5}{16}$  in. machine screws used for mounting the coil. Next drill two holes shown at A in the pictorial diagram in the coil form, locating the first hole  $\frac{3}{8}$  in. from end of coil form as mentioned above and the second hole  $\frac{1}{8}$  in. from the first one. Then carefully unwind 5 to 10 ft. of No. 22 enameled wire, being sure not to kink it as a kink may cause it to break while coil is being wound.

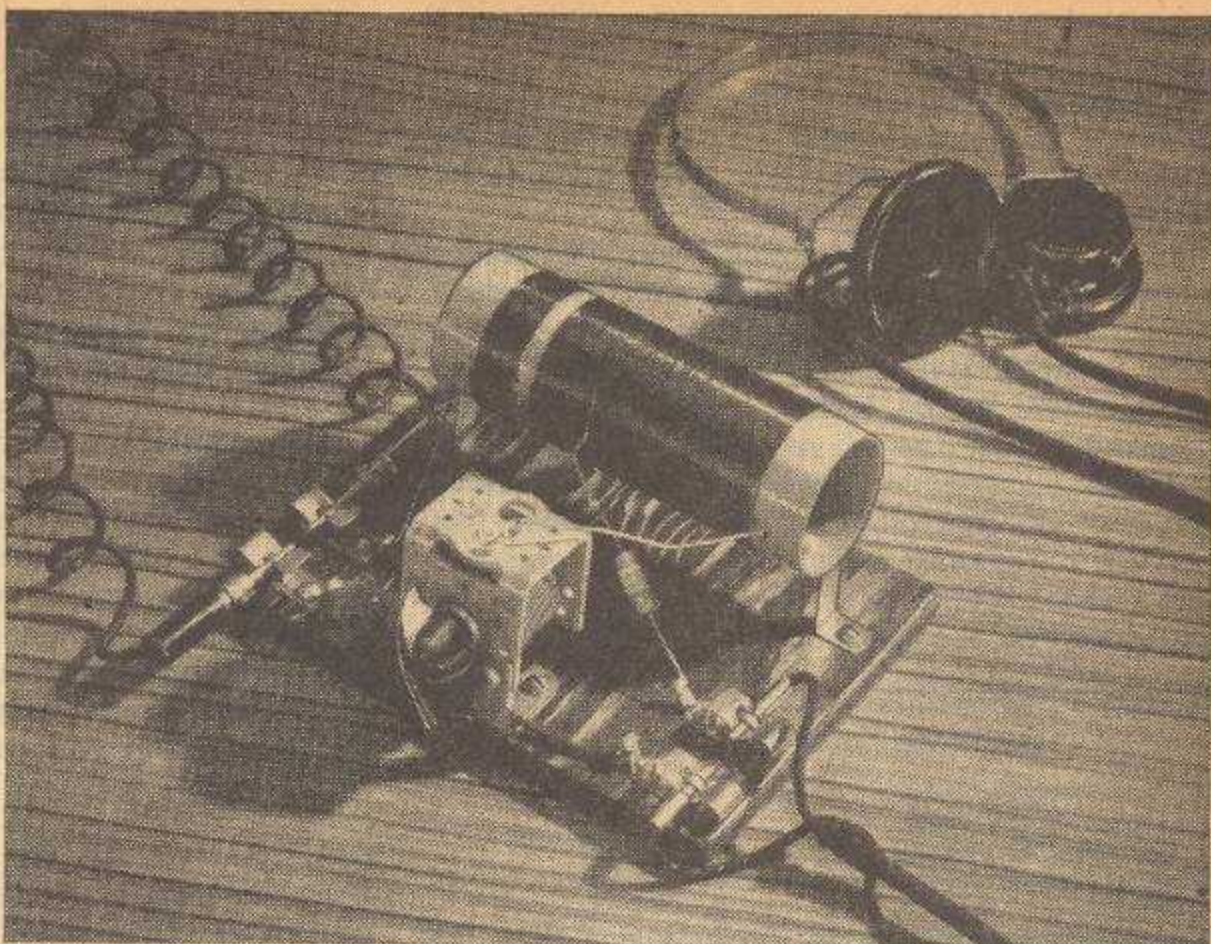
Pass about 5 in. of wire through the second of the two small holes in the coil form from the outside of the coil form towards the inside. Next pass the same wire through the first of the holes from the inside of the coil form, and pull small loop on inside of form taut. Fasten coil of wire



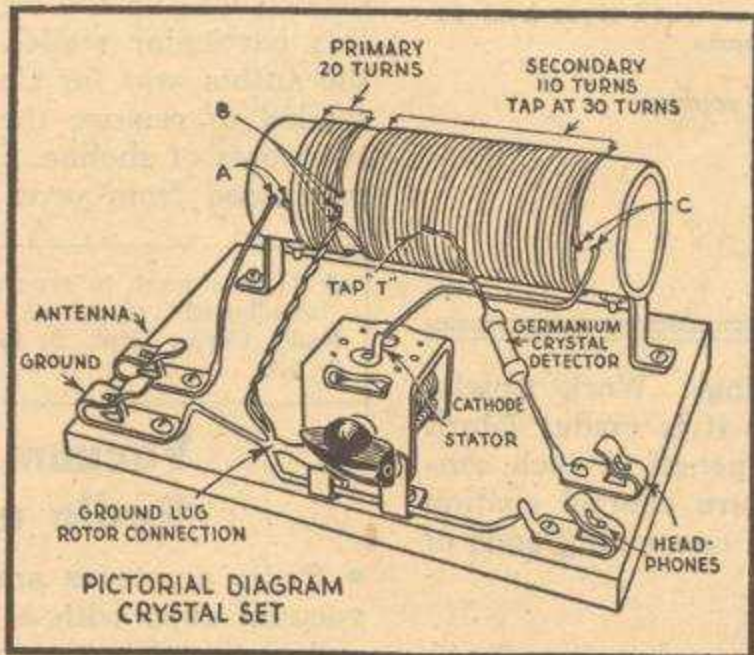
to a stationary object or have someone hold it, being careful not to cause any sharp bend in the wire. Pull the wire taut and slowly rotate the coil form, thus winding the wire on the form. Wind 20 turns on the form for the primary winding. Stop every few turns and press the turns of wire together so that coil form cannot be seen between turns of wire. After 20 turns are wound on the coil, leave approximately 5 in. of excess wire and cut off the remaining portion.

Drill three small holes at point B (see pictorial diagram) and fasten end of primary winding through two of these holes in the same manner as the beginning of the coil winding, using two of the holes. Use the center and remaining hole at B to fasten beginning of secondary winding. Start the secondary winding as you did the primary, with a 5 in. lead coming from the coil, and place 30 turns on the coil form. Place the tap (T in diagram), at 30 turns from point B on the coil; this tap or loop is made by scraping the black enamel coating from the wire, twisting to form a small loop, and soldering the wire together.

Now place the remaining 80 turns of the 110-turn secondary on the coil form and fasten end of winding through two small holes (at C in diagram). If you want to be able to adjust the sensitivity and selectivity of this crystal



Completed "breadboard" version of crystal set with headphones connected.

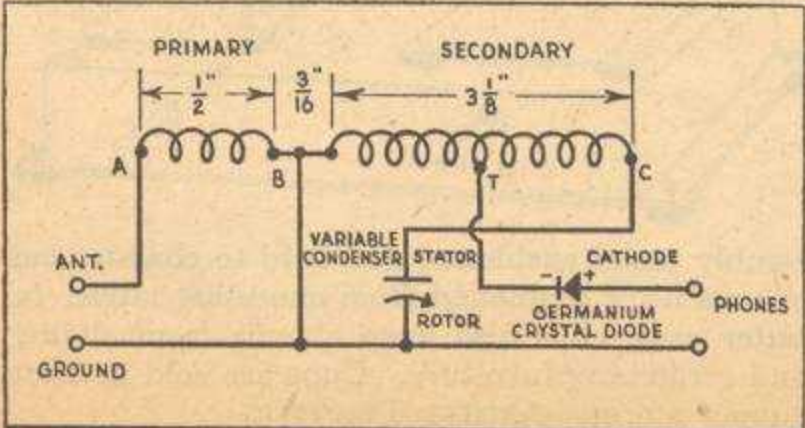


set, place taps every 10 to 15 turns while winding the secondary winding. But don't place any taps on the secondary before the first 30 turns. Receiver construction will vary depending upon whether a "breadboard" or cigar-box model is to be constructed. The wiring of the receiver will be the same regardless of which model is constructed, so instructions for constructing the "breadboard" model will be

given first, followed by instructions for mounting parts in a cigar box.

For the "breadboard" model, first mount the coil mounting feet on the coil form, taking care not to damage the coil. Then mount coil as shown on the pictorial diagram. Next mount the variable (tuning) condenser with angle brackets; be sure to place a solder lug under condenser mounting screw, as shown in the pictorial diagram. Fasten clips to baseboard with wood or self-tapping metal screws.

If receiver is being constructed in a cigar box, after coil is completed cement coil in location shown in photo, using a quick drying radio or model builders' cement. Let cement dry thoroughly before doing any further work on the set. Then mount the variable condenser in the box with cement and two No. 6 by 1/4 in. wood or self-tapping sheet metal screws. Mount the





four clips for headphone, antenna and ground connections in the box with the same size screws that were used to mount the tuning condenser. Be sure to mount a soldering lug on the frame of the tuning condenser with a No. 6 by  $\frac{1}{8}$  in. machine screw.

Solder all connections, using rosin core solder only (acid-core solder and acid flux may cause corrosion). Pre-heat parts for easier, better work by holding soldering iron tip against wire and terminal to be joined for a few seconds. Then apply just enough solder to cover connection and fill crevices between wires. Remove iron, but do not move wires until solder has set—this takes only a few seconds. When more than one wire is to be connected at a particular point, don't solder and resolder. Install all wires

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#### MATERIALS LIST—CRYSTAL SET

##### Receiver Parts:

- 1  $1\frac{1}{2}$ " x 5" coil form
- 55 feet No. 22 enamel wire
- 1 .381.4 mmfd. midget single gang condenser (Allied 61-009)
- 1 Germanium crystal diode (Sylvania type 1N34; Allied 7-219) or General Electric type 1N48 (Allied 7-250)
- 1  $1\frac{1}{4}$ " pointer knob
- 4 Fahnestock clips
- 1  $4\frac{1}{2}$ " x 6" x  $\frac{3}{8}$ " plywood base or wood cigar box, depending upon model being made
- 8 No. 6 x  $\frac{1}{4}$ " woodscrews
- 2 6-32 x  $\frac{5}{16}$ " or longer machine screws
- 2 coil mounting brackets
- 2 condenser mounting brackets
- 1 solder lug

##### Accessories:

- 1 2000 ohm headset
  - 1 antenna kit (Allied 83-100)
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to that point before soldering. Work slowly, checking each connection as it is made. Mark the diagram with a colored pencil as each connection is completed. Be sure enamel coating on wire is scraped off before connecting ends of coil into set.

#### Cure for Weak Stations

To get the best results, use a good antenna, good ground, and a pair of high-resistance headphones (1000 ohms or higher). In most cases a long antenna is unnecessary. However, if stations are weak, or if nearest one is a great distance from you, you may need to secure an antenna at least 50 ft. long and as high as possible, and adjust set for maximum sensitivity by moving connection at point T over to point C (see diagram). Use glass or porcelain insulators at the antenna ends and rubber-covered wire for a lead-in to prevent contact with grounded objects.

If taps are made on secondary winding when coil is constructed, move connection to crystal diode up and down coil until a tap is found which gives the best performance for the station being received. For a ground, drive a few feet of metal rod or pipe into moist earth or make a connection to a cold water pipe or radiator.

The broadcasting station microphone converts sound to an auto frequency (AF) current which fluctuates as the sound changes in pitch and volume. This AF current is an electrical pattern of sounds picked up by the microphone. Since it cannot be transmitted alone it is combined with a strong, steady radio frequency (RF) current. The combination is sent out through an antenna, becoming radio waves. The RF signal is called the "carrier" because it "carries" the AF signal. Some of these waves will strike your receiver antenna, setting up a current which travels to the set. The crystal detector "demodulates" the signal—that is, it takes out the RF signal, but allows the AF to continue to the headphones where it is converted to sound. The coil and tuning condenser select a particular signal from the many constantly striking your antenna. Hence you adjust the condenser to "pick up" the station you want.

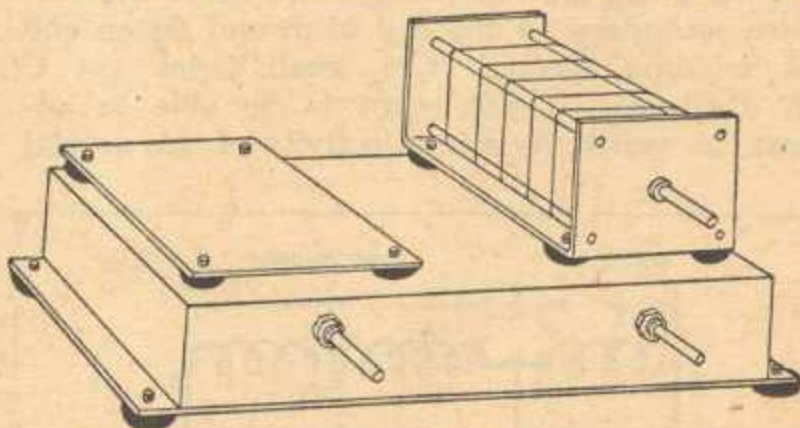
#### Kit Available

A complete kit for constructing the "breadboard" model of this receiver is available at a cost of less than \$3.00. This kit contains all materials necessary for constructing the "breadboard" model. The only extra components needed will be the cigar box when constructing this particular model. The cigar box used by the author was for Corina Larks cigars. It was sanded to remove the printing and then given two coats of shellac. The handle shown may be purchased from your local hardware store.

• If you want to secure the kit for constructing the "breadboard" model of this crystal set, write Allied Radio Corp., Dept. S, 833 W. Jackson Blvd., Chicago 7, Ill.

## Vacuum Cups Give Radio a Soft Ride

• Radio amateurs and experimenters find that vacuum cups with a machine-screw molded in and a thumb-nut attached, make good rubber cushions and shock absorbers on a receiver or transmitter chassis. Sketch shows a gang-condenser held and cushioned on chassis, a sub-as-



sembly panel cushioned and held to chassis, and chassis itself cushioned from operating table. In latter case, cups also keep chassis from sliding and scratching furniture. Cups are sold in most supply stores.—ARTHUR TRAUFFER.