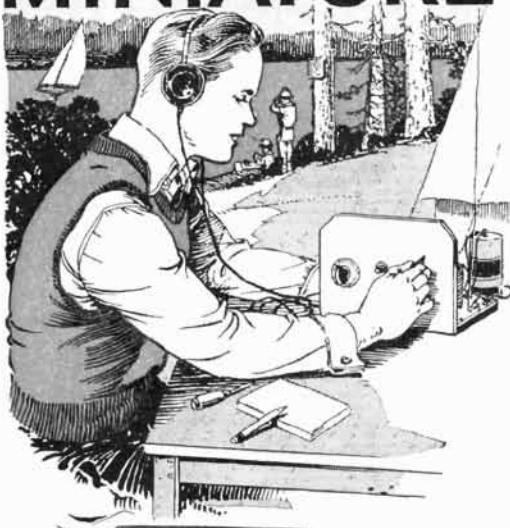


MINIATURE-TUBE SET



FLASHLIGHT-BATTERY receivers which have appeared in past issues have been very popular with beginners because the sets combine excellent performance with low cost. This latest set in the series is a 2-unit, 2-band receiver which is so easy to build that it makes an ideal "first set" for anyone who wants to try his hand at radio.

Despite its simplicity the set is capable of excellent performance. With a good antenna and ground, it will pull in just about all the stations that can be picked up on the usual home radio. It covers not only the broadcast band, but also the 160 meter and 80-meter amateur bands, and includes the police and aircraft bands. The receiver unit, Fig. 2, photo A, is complete in itself and will give good headphone volume. It is powered with 6 flashlight batteries that can be obtained from any "dime store" for 30c. The batteries furnish the low voltage necessary for one of the new low-drain RCA 1S4 "super midget" tubes in a special screen-grid detector circuit.

The amplifier unit, Fig. 3, may be added at a later date or built at once as desired. This unit employs the same type of tube

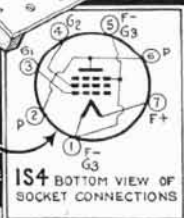
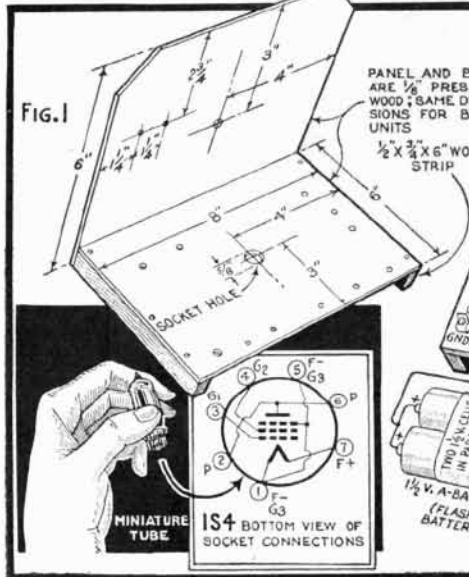
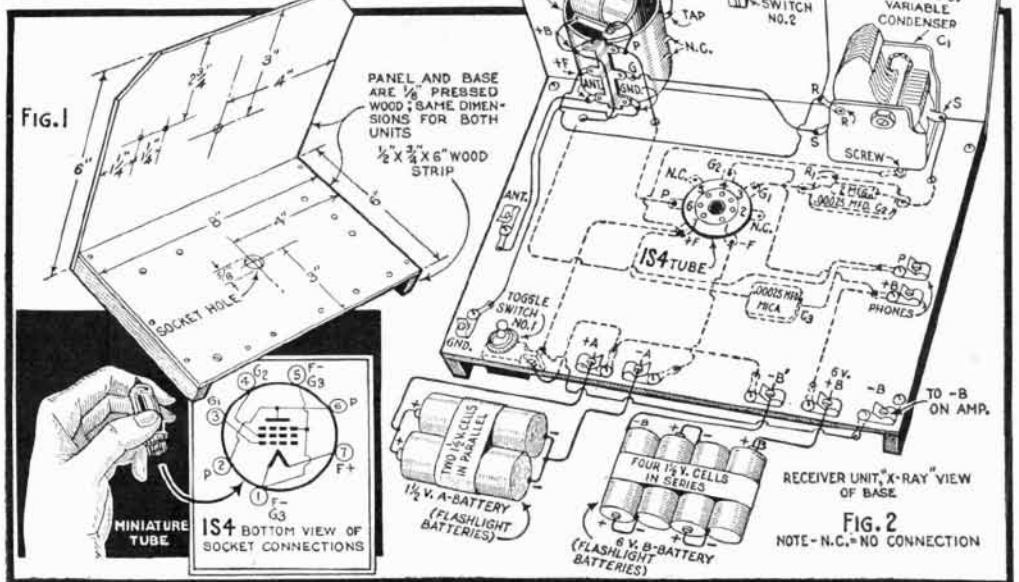
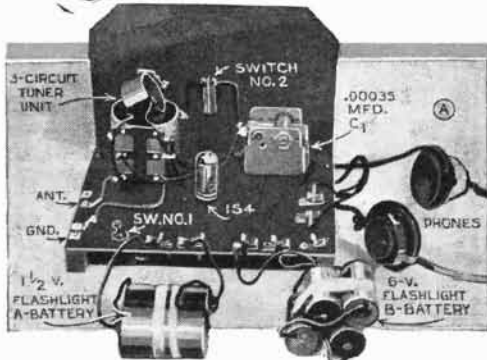


FIG. 2
NOTE - N.C. = NO CONNECTION

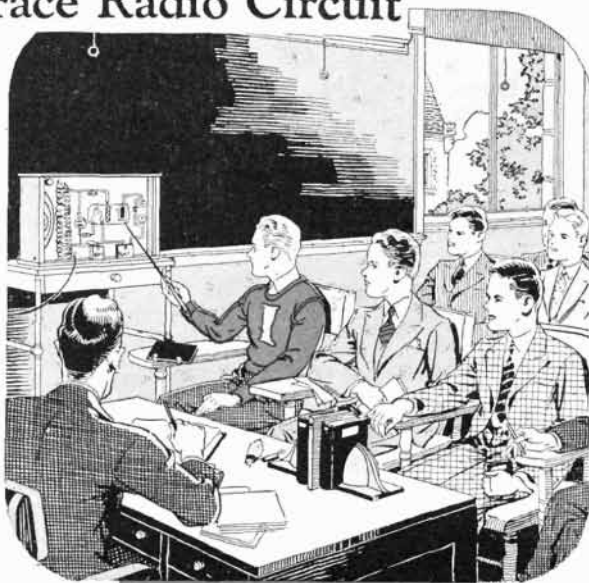


Radio

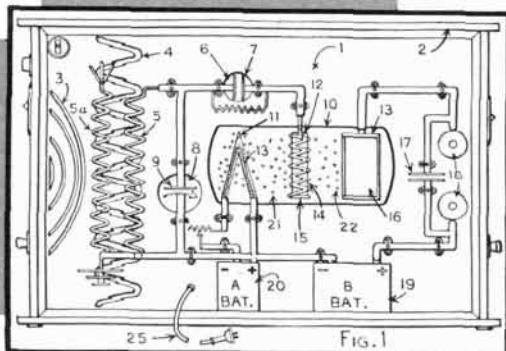
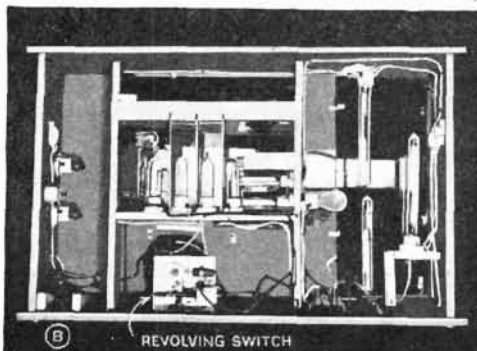
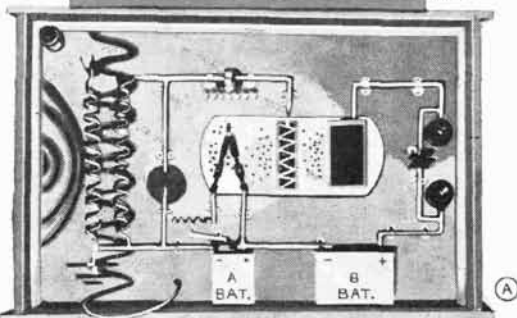
Flashing Lights Trace Radio Circuit

By Albert L. Daugherty

DESIGNED for teaching the principles of the vacuum tube, and a one-tube receiver in radio and science classes, this visual demonstration unit is housed in a large brightly painted cabinet. The wiring diagram is made of copper tubing and the various elements have openings behind their diagrammatic representation through which lights shine in the same sequence as the electric impulses travel in a real receiver. The openings are covered with red, yellow and green Cellophane so that the different electric circuits are easily traced as a revolving switch moves from one set of contacts to another. When the "phone" lights go on a buzzer sounds to indicate that the program is coming in. Photos A and B show front and rear views.



KEY TO FIG. 1: 1—panel; 2—cabinet; 3—incoming radio wave; 4—R.F. current; 5 and 5a—coils; 6—port for light; 7—grid condenser and grid leak; 8—port; 9—variable condenser; 10—area painted to indicate triode tube; 11—filament; 12—grid symbol; 13—translucent mirror for plate; 14—area with green Cellophane; 15—slot for grid light; 16—area behind plate, yellow Cellophane; 17—condenser; 18—actual phone caps with yellow lights in place of diaphragms; 19—yellow for B battery; 20—red for A battery; 21—holes representing electrons passing from filament; 22—holes in panel for electrons going to plate; 25—cord for 115-v supply for lights and switch.



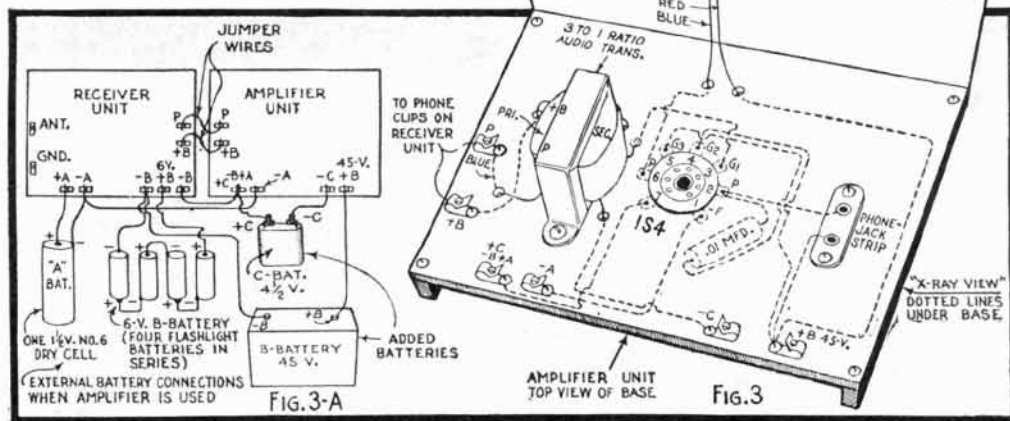
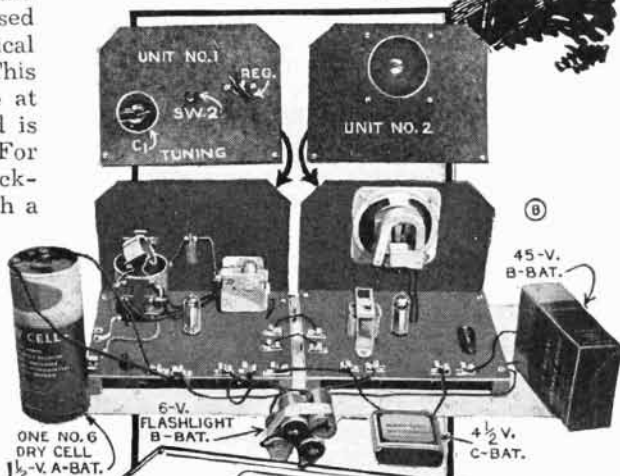
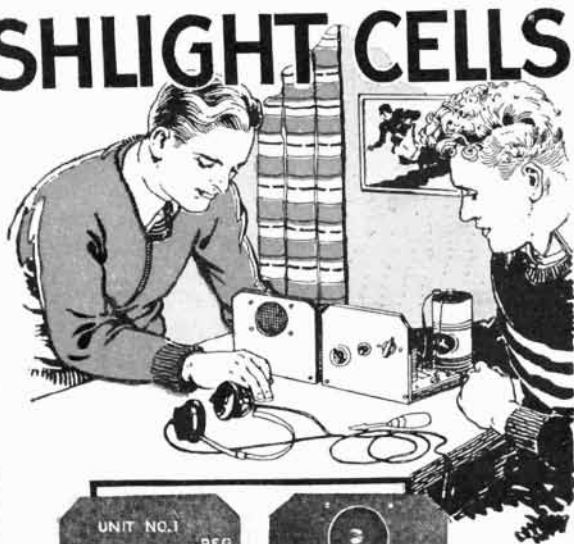
works on FLASHLIGHT CELLS

and increases the output to operate a 3-in. magnetic speaker with good volume on local stations. The additional parts required include, a 3 to 1, or $3\frac{1}{2}$ to 1 ratio audio transformer, a few clips, tube socket and terminal strip for phones which give best results on distant short-wave stations. A small single-pole, single throw switch with the blue speaker lead to cut the speaker in or out as desired.

For sake of easy construction the set is built on $\frac{1}{8}$ -in. hard pressed wood bases and panels of identical dimensions as detailed in Fig. 1. This inexpensive material is available at practically all lumber yards and is easy to work with simple tools. For example, the holes for the tube sockets, speaker, etc., can be cut with a sharp knife; the panel, base and wood mounting strips are fastened together with small wood screws, holes for which are easily drilled with a small hand drill. To mount the tube socket merely push it through the hole and then force on the retainer ring with two screwdrivers.

In constructing the receiver unit, Fig. 2, the variable condenser is bolted to the base panel. The rotor plates being common with the frame, soldering lugs may be fastened directly to the frame as shown for the condenser rotor-plate connections. The coil is of

(Continued to page 134A)



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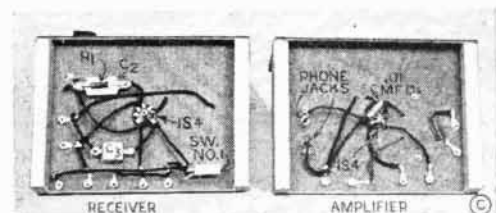
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FREE

Miniature-Tube Flashlight Cell Receiver

(Continued from page 617)

the 3-circuit-tuner type which has a terminal strip clearly marked for proper connections, greatly simplifying the circuit wiring for the novice. In addition, the coil has a movable "tickler coil" which makes the usual volume control or variable condenser for controlling regeneration unnecessary. Two small machine screws are used to bolt the coil assembly to the front panel. Finally mount the row of Fahnestock clips with machine screws and nuts, placing a round-hole soldering lug under each nut. One extra clip is mounted to connect in the negative-B lead so that when the loud-speaker stage is added it can be controlled



by the same "on-off" switch. The small round tuning dial plate is fastened to the front of the panel with china cement.

In assembling and wiring these units, follow the diagrams carefully, checking each wire as you put it in. Make all connections with rosin-core wire solder making sure that your iron is bright and well heated. Good mechanical and electrical connections are important in radio work. Although all parts for both receiver and audio amplifier are inexpensive, they should be of good quality, and just as specified. A detailed list of the original parts used in both units, is available from Popular Mechanics radio department without charge.

After the receiver is wired, you are ready to solder the flashlight batteries together. Scrape the ends with a sharp knife where they are to be soldered to insure a good connection. It will be noted that two of the cells are connected in parallel for the 1½ volt "A" battery. Connected in this manner the voltage remains at 1½ volts but the amperage is increased to double the usable life of the cells. Use a good set

(Continued on page 136A)

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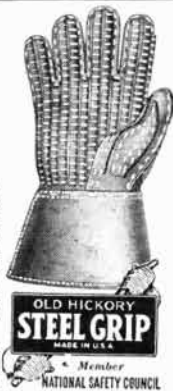
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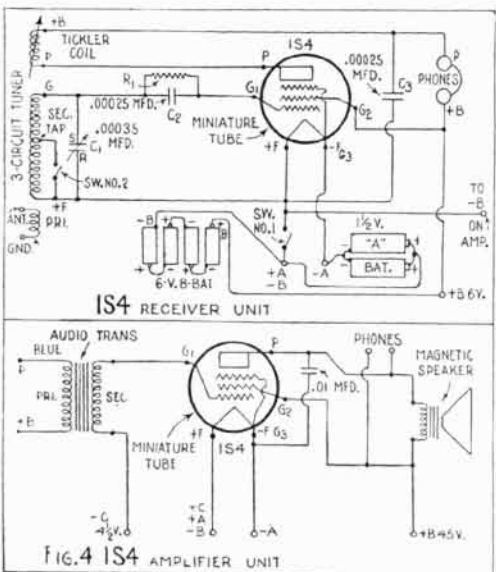
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(Continued from page 134A)

of, preferably new, 2,000-ohm headphones; old phones usually lack sensitivity. To test the receiver, connect the antenna, and a good ground on a cold water pipe; throw switch No. 1 "on" and turn the "tickler coil" until it lines up with the large coil. Now rotate the variable condenser slowly. Whistles indicate stations. When one is heard, rotate the "tickler coil" until the whistle stops and the station comes in



clearly. To tune in short-wave stations, throw switch No. 2 and tune slowly and carefully as these stations tune very sharp. Best results on the short wave bands will be obtained at night, especially the amateur and police stations. Some of the type IS4 tubes seem to operate more smoothly on 4½ volts of B-battery. If the set "pops" noticeably as the coil is turned, or breaks into squeals, use three of the cells in the B-battery instead of the four shown.

Construction details for the amplifier unit are clearly shown in Fig. 3 and the battery connections for using both units in Fig. 3-A and photo B. It will be noted that a large No. 6 dry cell is used for the A-battery and that a 4½ volt "C" battery and a 45-volt B-battery are added; the No. 6 dry cell replacing the two-cell flashlight A-battery in order to operate both units more economically. Schematic circuit diagrams for both units appear in Fig. 4. The blueprint number of this article is R-289.



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