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HOW TO BUILD A LOW-COST BUZZ-BOX

If you're presently using the H.O.M. (Hit Or Miss) method of timing your bike, you can put an end to the guesswork by building this simple buzz-box for about ⅓ the cost of a commercially-available one

by Mike Capalite

In many of my tune-up articles, I talk about using a buzz-box when setting the ignition timing. A buzz-box is simply a battery-operated circuit tester that uses a buzzing sound to indicate if a circuit is open or closed. To check your bike's timing, connect one buzz-box lead to the point spring and the other to ground. Rotate the crankshaft forward until the buzz changes tone; when this occurs, the breaker points have just opened or closed. If you match this tone change to the position of the piston before top dead center (either by using factory flywheel marks or a dial indicator), you can determine if the timing is correct or if it needs adjustment.

The main drawback with these units has been their high cost, usually in the $20 range. For the rider who only checks his timing a couple times a year, this price is a little steep. Of course, if you run your engine with incorrect timing, it could result in damage that will cost you many times the price of a buzz-box. Considering this, the price isn't so high.

I teach a class in motorcycle mechanics, so I frequently bring my buzz-box to class for the students to use. Recently, one of my students, who works for an electronics firm, commented that this unit was very similar in design to a code practice oscillator he built for practicing Morse code. When he brought the oscillator to class and used it in place of the buzz-box, it worked perfectly. He then informed me that he built it for less than seven dollars. All of the parts are available at most electronics stores, but he chose Radio Shack because they have numerous locations across the country.

He drew a schematic for me and then I assembled one; to my surprise, it worked. I then proceeded to build a couple more units, trying to see how cheaply I could do it. By using an old transistor radio, I got the total price down to about $4.75.

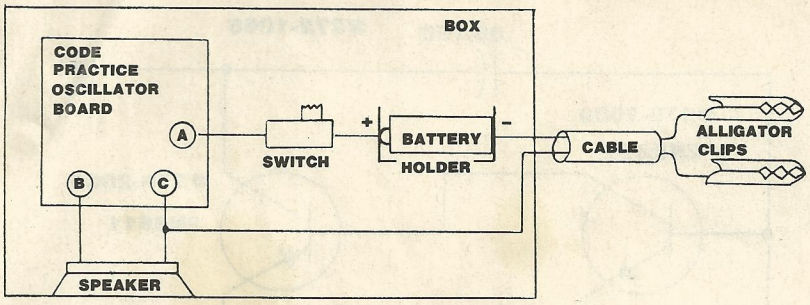
You can probably save some money by using parts you have around the house. For instance, a plastic food container or a coffee can makes a suitable housing for the unit, but the mini utility case is hard to beat for neatness. The on-off switch can be eliminated if you make sure the alligator clips don't touch when the unit is not in use. The oscillator module is a must because it prevents the rapid discharge of the batteries when the breaker points are closed.

Here is a list of the necessary items, plus Radio Shack's part numbers for them:

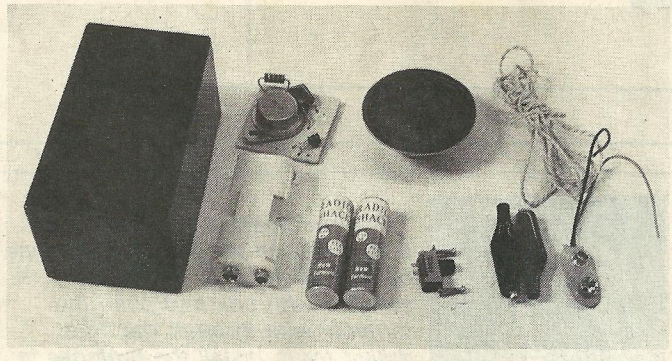
1—20-1155	Code practice oscillator module
1—40-245	Miniature P.M. 8-ohm speaker
1—270-231	Mini utility case
1—270-382	Penlight battery holder
2—23-468	AA penlight batteries
2—270-378	Mini alligator clips
1—270-325	9-volt battery snap
1—275-406	SPST subminiature slide switch
1—12-inch length of wire	

Since some of the required parts are only packaged in multiples, it might be a good idea for you to go together with some friends and build several units. One word of caution: Do not use a 9-volt battery because the unit is designed for use with a 1½- to 6-volt power source only. Another tip: Make sure you do not connect the battery backwards, for this can damage the module.

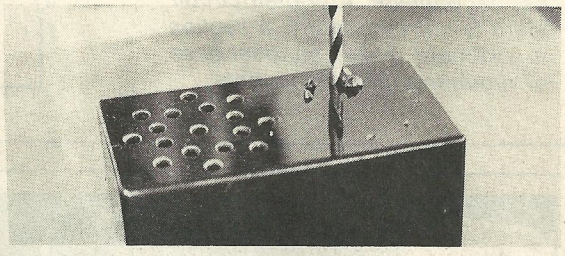
Here is the step-by-step procedure, with wiring diagrams, to assist you in making your own buzz-box.



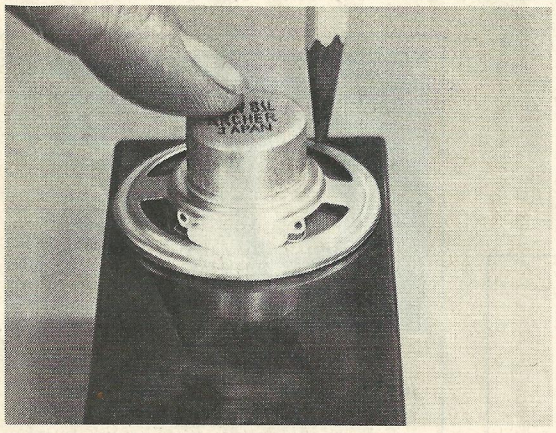
1 *This is the basic wiring diagram for the oscillator unit. As you can see, it is quite simple and all you need for assembly is a soldering gun and a small amount of solder. The A, B, and C terminals shown on the diagram are actually printed on the code practice oscillator board so it makes the operation almost foolproof.*



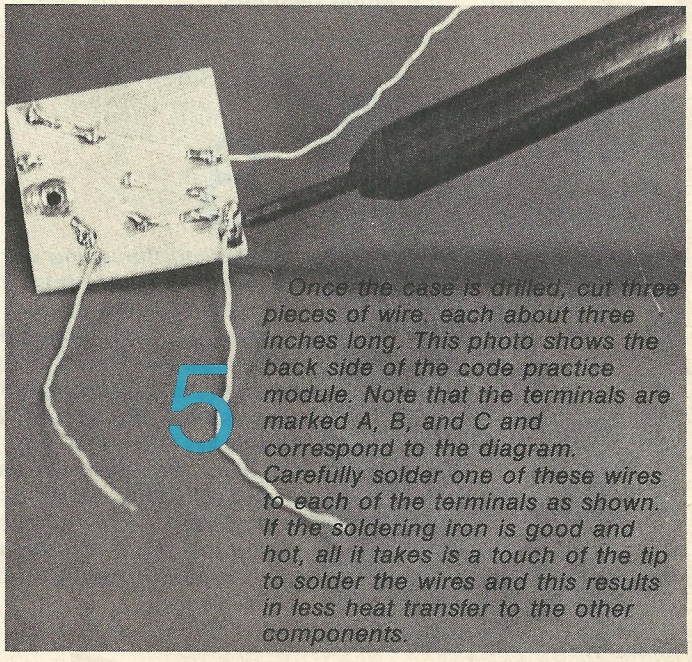
2 *This photo shows all of the required components prior to assembly. Although utility boxes are available in many different sizes, this one neatly holds all the parts, yet it is compact enough to fit in your toolbox.*



4 *Drill a small hole (about 3/32") on one side of the box for the test leads to pass through. If you are using the slide switch, you must make a square hole, and this can be tricky. Begin by drilling a 3/16-inch hole as shown here. Carefully square the hole with a small square or triangular file and then lengthen it until it measures 3/16" x 3/8". The hole must be longer than it is wide so the switch can move. Next, mark and drill the two holes for the switch mounting screws. The switch and lead wires are mounted toward the edge of the box because the battery holder fits in the center.*



3 *Position the speaker on top of the box as shown here, then draw a pencil line around the circumference. Next, drill several holes within the outline. These holes let the speaker's sound out of the box so you can readily hear it. Just a few random holes will suffice, or you can drill a professional-looking pattern. But remember, if you drill a bunch of holes, drill slowly and with light pressure because the case is made of plastic.*



5 *Once the case is drilled, cut three pieces of wire, each about three inches long. This photo shows the back side of the code practice module. Note that the terminals are marked A, B, and C and correspond to the diagram. Carefully solder one of these wires to each of the terminals as shown. If the soldering iron is good and hot, all it takes is a touch of the tip to solder the wires and this results in less heat transfer to the other components.*

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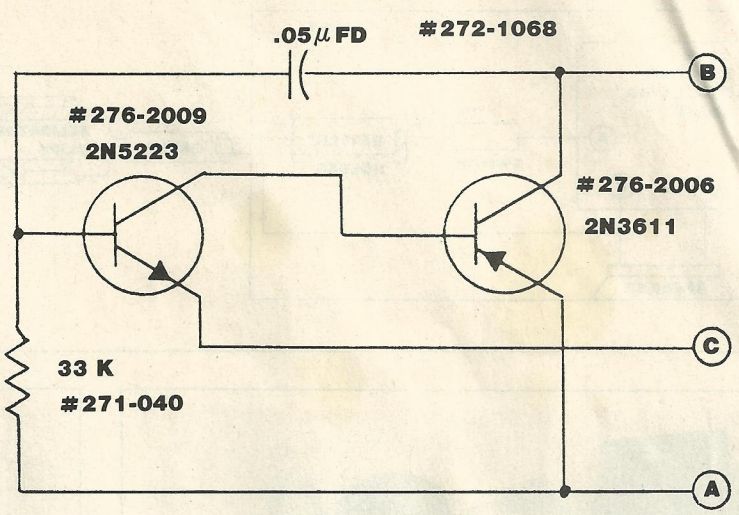
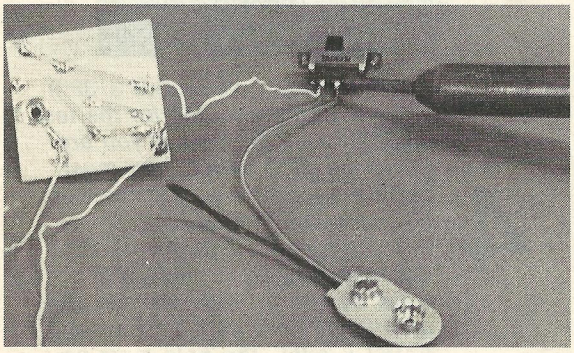
If you cannot find a ready-made oscillator module, use this schematic diagram and build one from scratch. I have included the Radio Shack part numbers for the necessary items, but if you purchase them individually, they run about half-again as much as the assembled module. Be sure to "heat sink" the components during the soldering procedure to prevent thermal damage. A printed circuit board is not mandatory; a section of perfboard makes an ideal base for mounting the components.





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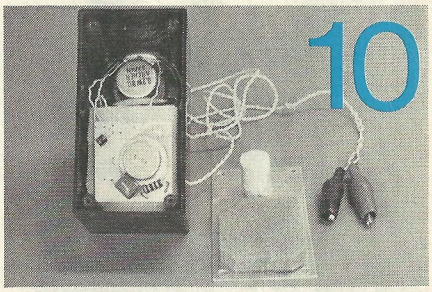
Solder the wire from the A terminal on the module to one side of the switch. Next, solder the red wire from the battery snap to the other switch terminal as shown here. Caution: It is very important to have the red wire from the battery snap connected to the switch. This insures the correct polarity as shown in the wiring diagram.

9

The nice part about making this unit is that all the soldering is done outside of the box. Install the switch in the box and push the terminal wire through the hole drilled for it. Install the batteries in their holder, making sure the bottoms are toward the springs. Push the speaker down into position; it's a tight fit, so it should remain in place. Now, if you slip the battery case in the position shown here, the speaker will hold the battery case in place and vice-versa.



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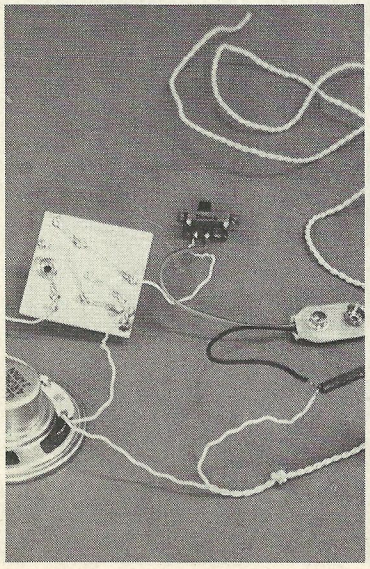
Although the components could just be stuffed in the box, they shouldn't be allowed to bounce around. You can prevent them from moving by inserting a small piece of foam rubber between the module and the battery case and gluing another piece to the case cover. A ¾-inch piece of styrofoam over the speaker, as shown, holds it in place. Solder the alligator clips on the test lead ends, put the cover on the box, and you have a buzz-box for less than $7. To operate: connect one clip to the contact points and the other clip to ground. When the points open or close, the tone changes.



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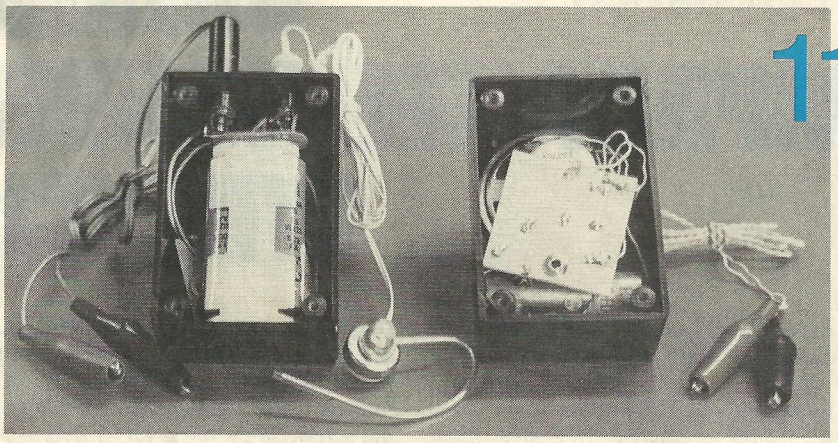
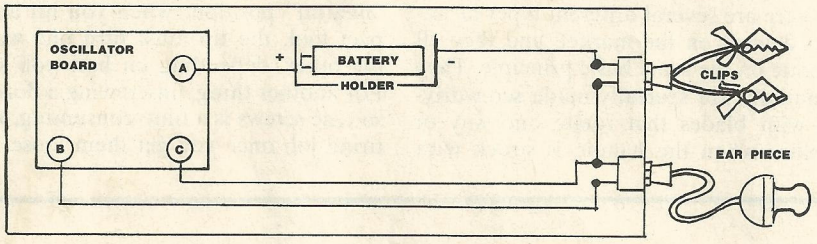
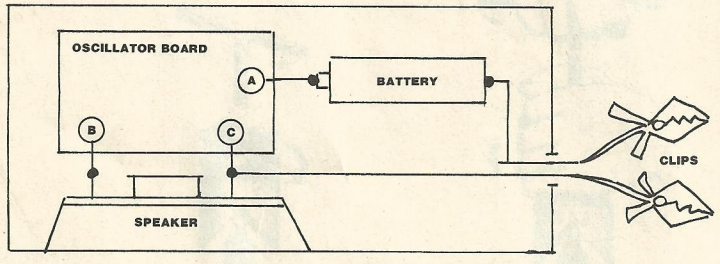
Following the wiring diagram, connect the B wire from the module to one side of the speaker. Take the test lead wires and solder one of them to the C wire from the module. Now, solder them to the other side of the speaker as shown. Attach the other test lead wire to the black lead from the battery snap and solder; cover this junction with a small piece of electrical tape. The knots tied in the test lead wires prevent them from being pulled out of the case.



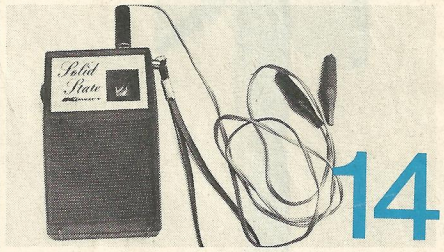
11 *There are alternative ways to build one of these units as long as the oscillator is wired into the system. The unit on the left uses an ear plug and phone jack instead of a speaker and a switch; the alligator clips connect to the phone jack wires. The phone jack acts like a switch; when it's unplugged, the unit is off. But the amount you save on the speaker and switch is about the same you will spend for the ear plug and phone jack, so this one is priced about the same as the previous one.*



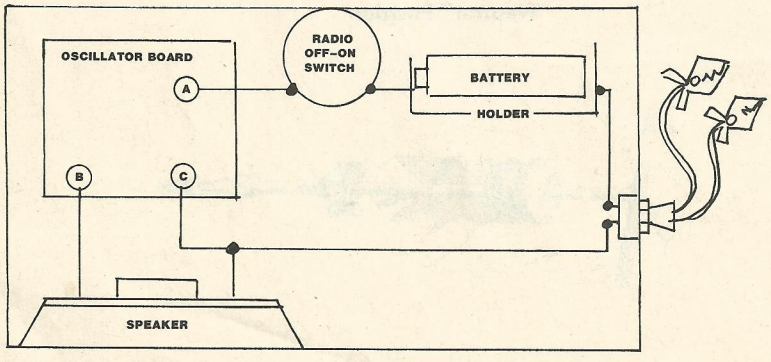
12 *Here is the wiring diagram for the ear plug/phone jack unit. This unit is handy to use when outside sounds prevent you from hearing the speaker.*



13 *The unit on the right in picture #11 is an economy model; one that costs about $4. There is no switch and the wires are soldered directly to the battery. Without a switch or phone jack, you cannot let the alligator clips touch one another when the unit isn't in use because the battery will run down. This is the schematic for the low-cost unit.*



14 *It's even cheaper to convert an old transistor radio into a buzz-box since it already has a speaker, an on-off switch and a battery snap. The ear-piece plug assembly can be converted to accommodate the alligator clips by cutting off the ear piece and installing the clips. If you want, you can even drill a hole in the module board and mount it in the case where the radio board was mounted.*



15 *This diagram shows how to convert a transistor radio for use with the module to make a buzz-box. I found that not all transistor radio speakers work, so if yours doesn't, replace it with a 2¼-inch speaker (Radio Shack Part No. 40-246). Whichever buzz-box you choose to build, it will save you a considerable sum of money.* ***CG***