Add a convenient hold feature to any phone!

TELEPHONE HOLD BUTTON

BILL GREEN

WE ALL KNOW THE STORY: WE'RE ON the phone in one room and need to be in another. So we lay down the first phone, go to the other phone and pick it up, go back to the first room and hang up that phone, and then go back to the second phone—the one we needed to be on in the first place. Or maybe we don't go back and hang up the first phone, so that when we finish our conversation we forget that it's off-hook—and then wonder why we didn't get the important long-distance call that we were expecting.
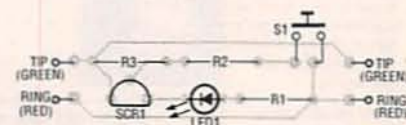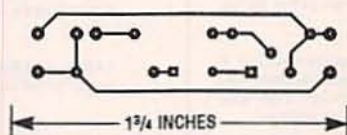

FIG. 2—PARTS-PLACEMENT DIAGRAM. You can make a PC board from the foil pattern we've provided and mount the parts as shown here, or use perforated construction board with point-to-point wiring.
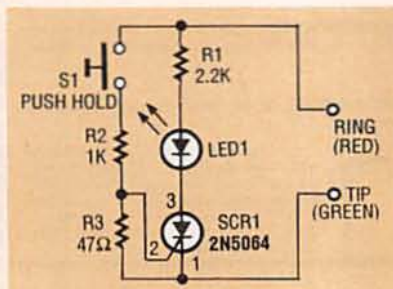

FULL-SIZE hold-button foil pattern.

FIG. 1—HOLD-MODULE SCHEMATIC. When S1 is pressed, the SCR fires and places LED1 and R1 across the phone line. The line voltage drops to about 20 volts, which holds the connection to the phone company's central office.

PARTS LIST

R1—2200 ohms ¼-watt, 5%
R2—1000 ohms, ¼-watt, 5%
R3—47 ohms, ¼-watt, 5%
LED1—light-emitting diode, any color
SCR1—2N5064, TIC47, MCR104 or equivalent silicon-controlled rectifier
S1—Normally-open pushbutton switch
PC board or perforated construction board, enclosure, wire, solder, etc.

If the above scenario is more real than you'd like to admit, we have a design for a simple and cheap little automatic hold module. It's so cheap (about $2.00) that you can make one for each of your phones.

How it works

As you can see from the schematic in Fig. 1, the hold module connects across the phone line. When all phones are on-hook, there is about 36 to 48 volts DC across the module. When S1 is pressed, the SCR fires and places LED1 and R1 across the phone line, which causes the voltage to drop to about 20 volts. Enough current flows to keep the SCR conducting when S1 is released. It's also enough current to keep the connection in the phone company's central office, so the phone is on hold. When any phone is picked up, the load of that phone causes the line voltage to drop to about 6 volts. At that point there is not enough current through the SCR to keep it conducting, so it turns off. When the phone is placed back on hook the line is released. Indicator LED1 glows when the hold is engaged. The gate of SCR1 is kept from floating and turning on when S1 is open by R3, and R2 limits the turn-on current through the SCR's gate.

The SCR (a 2N5064 or equivalent) has a 200-volt forward and reverse blocking voltage. The maximum ring voltage on the phone line is 140 volts. The 2N5064's minimum hold current is 5.0 mA at 25 degrees C.

Assembly

We have included a PC-board foil pattern for the hold module although it is simple enough to build on perforated construction board with point-to-point wiring. Figure 2 is the parts-placement diagram for the board. Select a small case for the project, or mount it inside your telephone. The prototype was installed in a telephone outlet box with a built-in modular jack, and a modular plug was added. That allows the hold module to be in-

stalled in line with any telephone. The PC board has TIP (green) and RING (red) available at two places for the modular jack and plug. However, if you are installing the board inside a phone, you can hardwire the circuit directly across TIP and RING, without using any input and output jacks. Figure 3 shows the author's completed prototype.

Using the hold module

To put a phone on hold, press and hold S1 until you hang up the phone; LED1 will glow when the phone is on-hook. As we said before, the hold is automatically released when any phone is picked up. In the event that your phone line is above or below 40 volts by very much, you might need to vary the value of R1 to compensate for the difference. The hold module will not put a significant load on a telephone line, so you can add as many of them as you like. **R-E**