

REMOTE TELEPHONE EAR— Listen via Long Distance

*This device—the fourth in a series of phone gadgets—
lets you monitor sounds in your home or office
when you call your telephone from a remote location.*

JULES H. GILDER

IN THE APRIL AND MAY 1977 AND MAY 1978 issues, we showed how to construct add-on telephone accessories that let you turn on and turn off various household appliances by remote control, build a hands-off telephone amplifier and assemble an autodialer and cassette interface that dialed authorities or neighbors in case of a fire or intruders in your home.

If you were interested in these items, you'll flip over the Remote Ear that lets you dial your home phone and then listen for the sound of running water or a radio that was inadvertently left on. Or maybe you just want to check your house and see that everything is quiet and no one has broken into it.

The Remote Ear is an adaptation of the Teleswitch circuit (April 1977). It automatically connects a microphone and amplifier to the telephone so that you can monitor a remote location. As you will quickly see from the schematic, the Remote Ear uses the same type of signal detectors as the Teleswitch. However, instead of having controlled outlets to turn devices on and off, the Remote Ear has a small three-transistor amplifier connected to it.

This amplifier is identical to the one described in the Speakerphone circuit (May 1977). Its signal is very clear and audible. The output of the amplifier, which is located in the area that you want to monitor, is fed to a small speaker that is acoustically coupled to the telephone mouthpiece.

Since it is unlikely that remote listening will be done for long periods of time, the Remote Ear has a built-in timer that allows you to listen for about three minutes. Longer or shorter listening times

can be set by adjusting the timing resistor in the emitter circuit of unijunction transistor Q2.

About the circuit

Sound switch 1 and the unijunction timer that is associated with it (Q1) are the same as were used in the Teleswitch. Sound switch 2, however, is slightly modified. Instead of having one relay connected to the 2N3904 collector, there are two relays, RY2 and RY4.

The operation of the Remote Ear involves several steps. When the telephone rings the first time, sound switch 1 triggers and causes RY1 to close. This applies power to sound switch 2 and to the two timing circuits consisting of unijunction transistors Q1 and Q2.

If the phone rings more than once, within 20 seconds sound switch 2 triggers and RY 2 closes. Contact RY2-1 disconnects the power from the first unijunction transistor timing circuit and from sound switch 1. This prevents the Remote Ear from being activated and makes it necessary to wait three minutes before the next attempt.

If, however, the phone rings only once, there is enough time for a charge to build up on C1 and for Q1 to trigger, activating RY3. When RY3 is activated it switches the RY2 coil out of the control circuit of sound switch 2 and replaces it with the RY4 coil.

The first time the telephone rings only once it arms the circuit. The next time the telephone rings it turns on the listening circuitry. This is done by sound switch 2 activating RY4, which, in turn, controls the amplifier and the answering solenoid.

Relay RY4 latches closed and is held in that position until a reset pulse from unijunction timer Q2 turns off the 2N3904 controlling RY2 and RY4 and unlatches SCR2.

The telephone is actually answered by a solenoid that pulls up when RY4 closes. This releases the cradle switch and answers the phone. The handset of the telephone is placed on the table alongside the telephone. The loudspeaker connected to the output of the amplifier is held next to the mouthpiece (rubber bands can be used). Thus, the sound picked up by the crystal microphone is amplified and acoustically coupled to the telephone.

After three minutes, or whatever time period you selected has elapsed, a reset pulse is generated and the bases of the control 2N3904's are brought to ground potential, turning these transistors off and unlatching the SCR's. The unit is now ready for its next monitoring period.

Construction

This project is constructed from four modular circuits. The first two circuits are sound switches identical to those built in the Teleswitch (April 1977). After the sound switches are built, they should be mounted in a metal chassis that is large enough to be placed under the telephone. A 5 × 9 × 2-inch aluminum chassis was used for the prototype. A 1/8-inch hole should be drilled where each of the crystal microphones is mounted so that sound will reach them more easily.

After the sound switch modules are mounted, assemble the control module using the circuit shown in the schematic. The circuit can be fabricated by wiring

the components on perforated board or you can design a printed circuit.

After the control module is completed, mount the board, using spacers, at any convenient spot under the chassis. The only component left to be mounted is the amplifier. The amplifier used here is identical to the one used for the Speakerphone. Mount this module also on the chassis, using spacers.

Once all four modules are mounted, do the relays. Now connect all the wires

solenoid until the fully extended plunger holds the cradle switch down. Attach the solenoid to the wooden support with two screws.

Now attach two conductors of conventional lamp cord to the two terminals on the solenoid. Then, insulate these terminals with electrical tape. Bring the lamp cord down the support, attaching it to the wood in several places with staples. Be careful that staples do not pierce the insulation of the wire, causing a short circuit.

radio. Place the speaker next to the telephone mouthpiece.

Ask a friend to call and let the telephone ring several times. On the first ring, RY1 should close. On the second ring, RY2 should close, opening RY1. After three minutes, a reset pulse from Q2 should reset the lower SCR opening, RY2.

After another three minutes have passed and RY2 has reset, have your friend call again, tell him to ring only

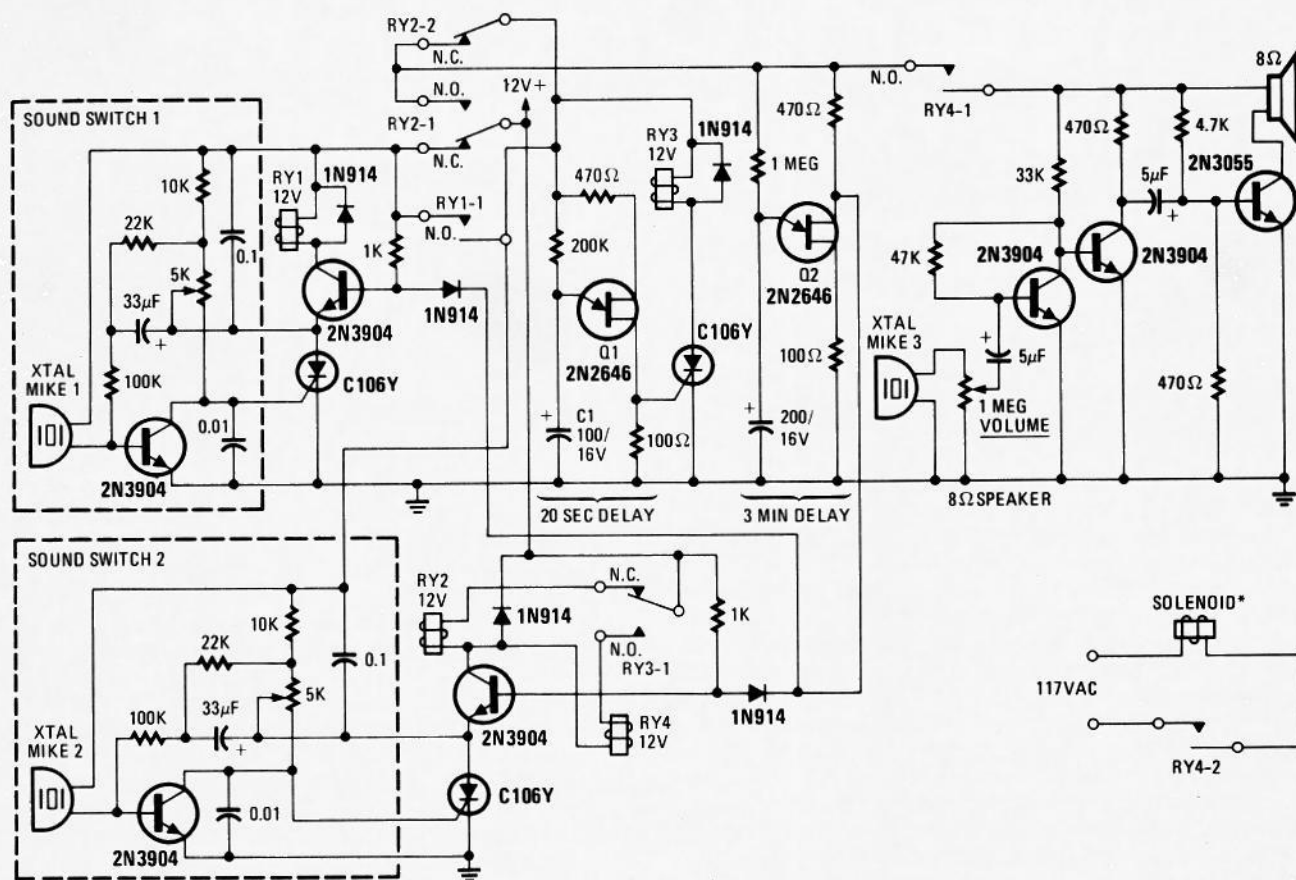


Fig. 1

from the modules and the relays that go together directly to the positive side of the supply. If an external battery is going to be used to supply power, connect these leads to a screw terminal that is insulated from the chassis. If the power supply described for the Teleswitch is used, connect the leads to the positive terminal of the supply. Do the same for all ground leads. Connect all remaining wires to their proper locations.

Cut a piece of 1 × 2-inch wood to a length of 10 inches. This will be used as a vertical support for the solenoid that will hold the phone in the unanswered position until the proper command signal is given. To position the arm, place the telephone on top of the phone cradle where the handset is normally placed. Mark the spot, because that is where you want to mount the arm, and mount the arm using at least two screws. Next, place the solenoid on the inside of the arm and take the handset off the telephone. Position the

Bring the wire into the bottom portion of the chassis through a grommet-lined hole and attach one of the two strands to one set of normally open contacts on RY4. Attach another piece of single-conductor lamp cord to the other contact of the set. This wire, along with the unused wire from the solenoid, will be connected to the AC line.

Mount two miniature jacks to the chassis for the microphone and the speaker. The speaker can be acoustically coupled to the telephone by simply holding it next to the telephone mouthpiece with a few rubber bands. The microphone should be located in the spot you want to monitor.

Installation and operation

Installing the Remote Ear simply requires placing the telephone on the chassis, removing the handset and allowing the solenoid to hold the cradle switch down. Now, place the microphone in the room you want to monitor and turn on the

once, and then call back 20 seconds later. On his second call, the phone should be answered automatically after the first ring. This is done by RY4, which becomes activated by sound switch 2 when the phone rings the second time. Relay RY4 closes the circuit to the solenoid and causes it to lift up, releasing the cradle switch of the telephone.

Relay RY4 was activated because after 20 seconds had elapsed, Q1 produced a pulse that activated RY3 and switched the power line from RY2 to RY4.

When the call is answered your friend should hear the radio playing. If he does not, check to make sure that the speaker is properly placed next to the mouthpiece of the telephone. Three minutes after the first ring, Q2 generates a reset pulse and releases RY4. This causes the solenoid to drop and hang the phone up. Simultaneously, it opens the circuit to the amplifier. The Remote Ear is now ready to use again.

R-E