



Telephone Transmitter

Receive telephone conversations on any FM radio with this neat little device.

BY MARC SPIWAK

Would you like to be able to amplify a phone call so everybody can hear it? Or perhaps you'd like a way to record phone calls for record-keeping purposes. If either idea sounds good to you, then you might want to build the *FM Telephone Transmitter* described in this article. It's a simple, yet ingenious device that connects in series with a phone line, "steals" power from the latter, and transmits both sides of a conversation to an FM radio tuned to between 90 and 95 MHz.

The circuit is built on a PC board that

is so small it can easily be fitted inside the housing of a telephone making it an instant pseudo-speak earphone. Keep in mind, though, that it is illegal to listen to or record a telephone conversation without informing all involved parties.

There are many legitimate reasons for wanting to broadcast a telephone call to an FM receiver. For one, maybe you are calling one of those "900" information or entertainment lines, and everybody wants to hear the message. Or perhaps, when someone calls long distance, he or she

doesn't have the time or can't afford to stay on long, but everybody at home still wants to hear his or her voice. Or perhaps you want to record a phone call so that you have a record of some electronic banking you did or a deal you made.

shunt that decouples power and audio from the amplifier circuit.

Construction

The circuit is simple enough to build on perforated construction board, but the tight design of the PC board shown in Fig. 2 is more desirable. If you would like to use a PC board, you can either use the foil pattern provided in that figure to make your own PC board, or order a pre-etched and drilled board as part of a complete

parts kit available from the source given in the Parts List.

When mounting parts to the PC board, use the parts-placement diagram shown in Fig. 3 as a guide. Begin by installing the resistors and diodes; the board is so tight that those components must be mounted vertically.

The next step is to install the inductors. Coils L1 and L2 are six and eight turns, respectively, of enameled copper wire. If you are winding your own coils, use approximately 22-gauge wire and a 1/8-inch drill bit as your winding form. Any enamel on the leads where the coils are to be soldered must be sanded, scraped, or burned off with a soldering iron before solder will adhere to them properly. Coil L3 is six turns of tinned copper wire in which the coils must be spread out with about 1 millimeter between each of turn; none of the turns should be touching each other. A tap is connected between the top of the first turn of L3 and the PC board.

Go on to install the fixed capacitors and the variable one. Then you can solder the two transistors to their appropriate places. The kit mentioned in the Parts List includes alligator leads for connecting the Transmitter to the phone line. However, the author opted to modify a modular phone cord and install the board in series with it. The Transmitter can then easily be swapped between different phones. Be

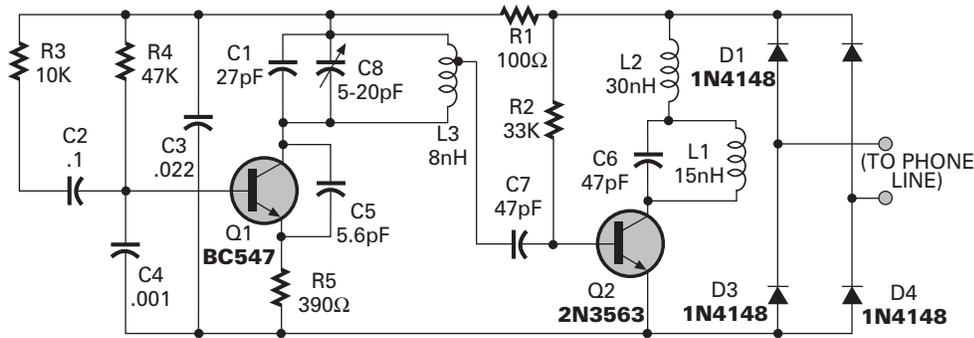


Fig. 1. Here's the FM Telephone Transmitter schematic diagram. The circuit connects in series with a phone line, "steals" power from it, and transmits both sides of the conversation to an FM radio tuned between 90 and 95 MHz.

Besides being small in size, the Telephone Transmitter is also "small" in price. Only a handful of parts is needed to build the project, and everything you need (including a PC board) can be purchased as a kit for only \$9.95.

Circuit Description

The schematic diagram for the Telephone Transmitter is shown in Fig. 1. That circuit connects in series with either the Tip or Ring (green or red) leads of telephone line. Power for the circuit is full-wave bridge rectified from the phone line by diodes D1 through D4.

Transistor Q1, capacitors C1 and C8, and inductor L3 form an FM oscillator that operates at a frequency of around 93 MHz.

Variable-capacitor C8 allows the oscillator frequency to be adjusted between 90 and 95 MHz. To move the tuning area up to the 98 to 105-MHz range, C1 must be replaced with a 10-pF capacitor.

Audio from the phone line is coupled through R3 and C2 to the base of Q1 where it frequency modulates the oscillator. Transistor Q3 inductor L1, and capacitor C6 form a power amplifier circuit. The signal tapped off L3 in the oscillator circuit is fed to the base of transistor Q2 and the FM signal is transmitted from Q2's collector. Inductor L2 is a radio-frequency

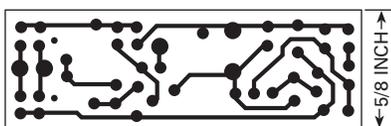


Fig. 2. If you'd like to etch your own circuit board for the Transmitter, use this template.

certain to inspect the board for errors before connecting it to the phone line. The range of the Transmitter is less than 100 feet. That distance can be increased, however, by soldering a wire antenna (about 150 cm of 26 gauge wire) to the collector of Q2.

Test And Tune

Connect the Transmitter to the phone line using whatever method you prefer. Turn on a nearby FM radio and tune to a quiet spot (no station using that frequency) on the dial somewhere between 90 and 95 MHz. Pick up the phone; you should hear the dial tone right away on the FM radio. If that is not the case, adjust C8 until you do hear the dial tone. First adjust C8 for the best reception, and then fine tune the radio.

Should you have trouble finding a spot on the dial that is quiet enough, remember that the tuning area can be moved up to the 98- to 105-MHz range by replacing C1 with a 10-pF capacitor..

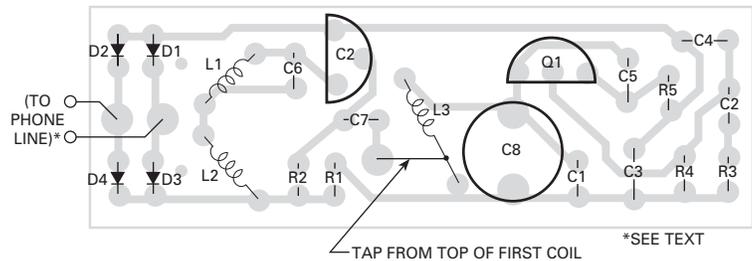


Fig. 3. Use this parts-placement diagram as a guide when mounting components on the circuit board.

PARTS LIST FOR THE FM TELEPHONE TRANSMITTER

SEMICONDUCTORS

- Q1—BC547, BC107, NTE123A, NPN transistor (or equivalent)
- Q2—2N3563, ZTX320, NTE108, NPN transistor (or equivalent)
- D1-D4—1N4148 silicon diode

RESISTORS

- R1—100-ohm
- R2—33,000-ohm
- R3—10,000-ohm
- R4—47,000-ohm
- R5—390-ohm

CAPACITORS

- C1—27-pF ceramic-disc
- C2—0.1- μ F ceramic-disc
- C3—0.022- μ F ceramic-disc
- C4—0.001- μ F ceramic-disc
- C5—5.6-pF ceramic-disc
- C6, C7—47-pF ceramic-disc
- C8—5- to 20-pF trimmer

ADDITIONAL PARTS AND MATERIALS

- L1—15-nH (nanoHenry), 6 turns of enameled copper wire (see text)
- L2—30-nH, 8 turns of enameled copper wire (see text)
- L3—8-nH, 6 turns of tinned copper wire (see text)
- Printed-circuit materials, alligator, clips, wire, solder, hardware, etc.

Note:

The following is available from Marlin P Jones & Associates, Inc.
 PO Box 12685
 Lake Park, FL 33403-0685
 Tel. 800-OK 2 ORDER or 407-848-8236
 Fax: 407-844-8764)

FM Telephone Transmitter Kit (#6016-KT—includes everything specified in the Parts List)—\$9.95 plus \$3.00 shipping and handling. Florida residents please add appropriate sales tax.

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