

TRANSISTORIZED TELEPHONE PICKUP

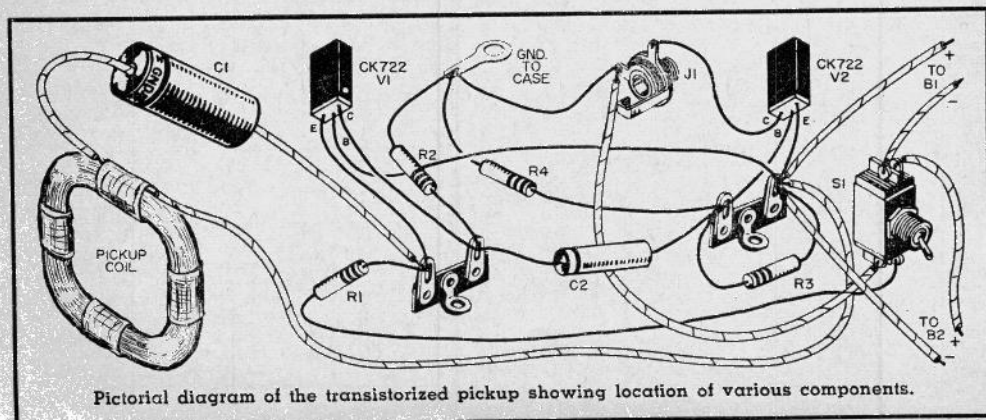
By GEORGE BERRY

AN "AUDIENCE" at one end of a telephone conversation is often desirable. However, telephone company rules forbid connecting external devices to their lines since such devices can impair line balance and ringer operation. The solution to this problem is to use an induction pickup.

The little gadget to be described here consists of a home-made pickup coil, taped

to the outside of the telephone wall box, plus a small transistor amplifier and a pair of headphones. Headphones enable a third person to hear both ends of the conversation.

The transistor circuit is conventional and requires no hard-to-get parts. The amplifier was built in a standard 2 1/4" x 2 1/4" x 4" "Flexi-Mount" aluminum box. As shown in

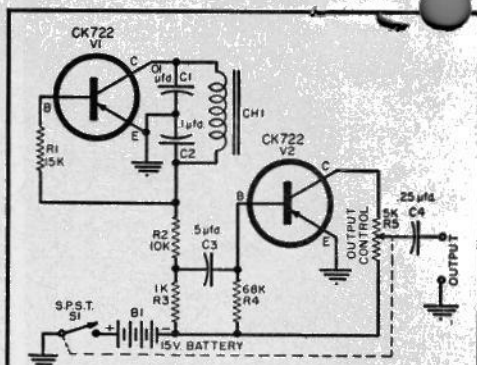


checked for an "open" using this technique. Simply "inject" the audio signal on each side of the capacitor and note the results obtained. If the signal disappears on the "input" side of the capacitor, a replacement is indicated.

Gain Tests: Where an amplifier is "weak" rather than "dead," the transistor audio signal generator may still be used to isolate the defect to a specific stage (or stages). The audio signal is applied to each stage of the amplifier, in order, and the output and input signals to the stage measured, using an oscilloscope or a.c. v.t.v.m. By comparing the two signal levels, the gain of the stage is immediately determined, and "weak" stages are effectively isolated.

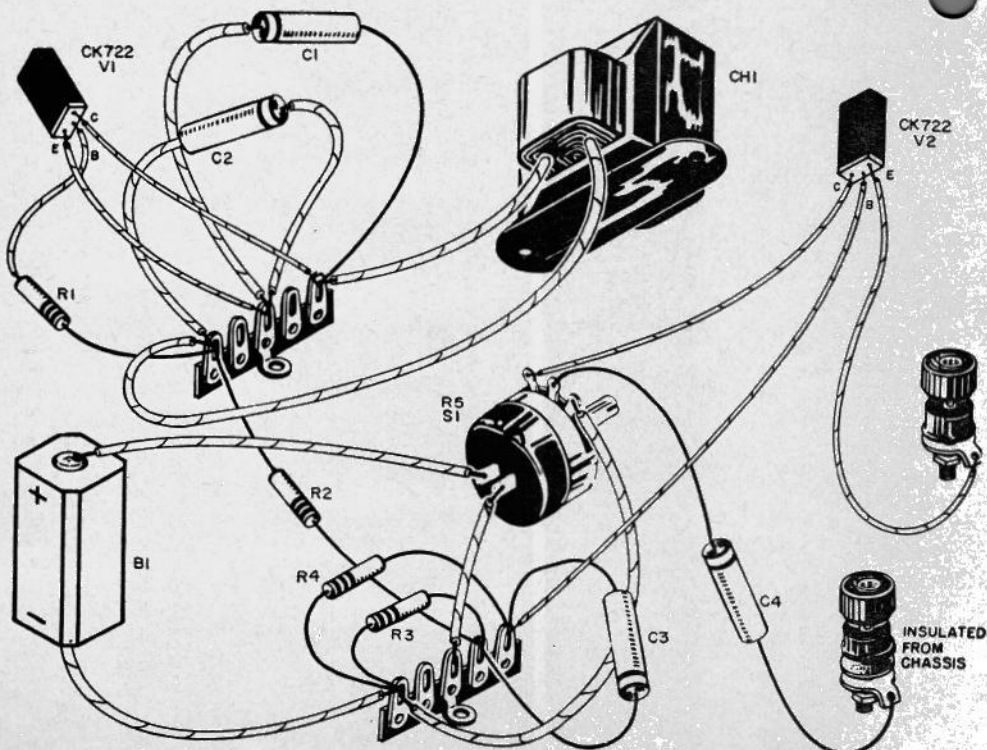
Distortion Tests: Since the transistorized audio signal generator supplies a good quality sine wave, the instrument may be used for general distortion tests. The audio signal is applied to the suspected stage and the appearance of the output observed on the screen of an oscilloscope. If the positive half-cycle of the applied sine wave has been flattened, it generally indicates either insufficient bias, a weak tube, or low screen or plate voltages. If the negative half-cycle of the applied signal has been flattened, it generally indicates excessive bias.

-30-

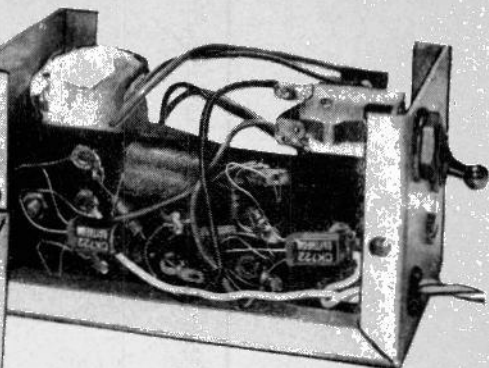
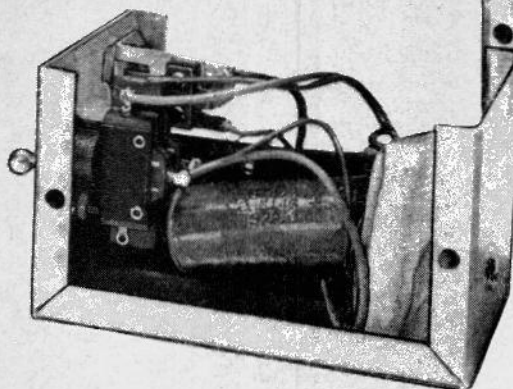


- B1—15 v. hearing-aid battery (Burgess U-10)
 C1—0.01 μ fd. paper capacitor
 C2—1 μ fd. paper capacitor
 C3—5 μ fd. "metalized" paper capacitor
 C4—25 μ fd. "metalized" paper capacitor
 CH1—Small choke or output transformer (see text)
 R1—15,000 ohm, $\frac{1}{2}$ w. carbon resistor
 R2—10,000 ohm, $\frac{1}{2}$ w. carbon resistor
 R3—1000 ohm, $\frac{1}{2}$ w. carbon resistor
 R4—68,000 ohm, $\frac{1}{2}$ w. carbon resistor
 R5—5000-ohm carbon potentiometer
 S1—S.p.s.t. switch (on R5)
 V1, V2—P-n-p junction transistor (Raytheon CK722)
 I—Cabinet (Bud CU-3001 Minibox)
 Misc.—Binding posts, hardware, small knob, solder, wire

Fig. 1 (above) is a wiring schematic of the signal generator. A pictorial diagram showing the various components is given below.



Completed telephone pickup consists of a home-made pickup coil, small transistor amplifier and headphones. Pickup coil is taped to outside of a telephone wall box.



Side views of amplifier with cover removed. Layout is not critical, and shielding is unnecessary. The conventional transistor circuit requires no hard-to-get parts. This pickup can be duplicated by the constructor for about \$10.00. Experimenters may use the coil and amplifier for audio induction tests.

the photographs, the circuitry is mounted on a card of $\frac{1}{16}$ " Bakelite with nine eyelet lugs riveted in for the tie points. Any handy type of construction will work. Layout is not critical and shielding is not necessary. The power supply consists of four "Penlite" batteries, wrapped with tape and placed in the right-hand corner of the case.

Solder the transistor leads only after all other connections have been soldered to their terminals. Leave the leads full length, hold them an inch back from the end, and solder quickly with a hot clean iron. If soldering is done properly, the fingers won't feel the heat. Excess heat will ruin transistors.

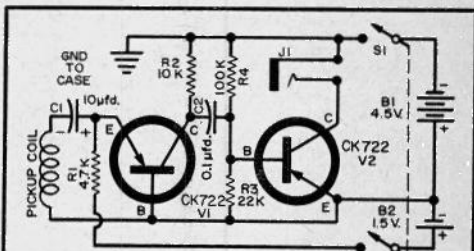
On desk-type phones without a wall box, signal pickup is not as good but still usable. A thin, flat, doughnut-shaped coil of about 360 turns of No. 30 "Formex" or similar wire—four inches in diameter—is better here, placed flat against the bottom of the phone base.

In place of the transistor amplifier, any audio amplifier having a mike input will work with these pickup coils. Use a 200-ohm line-to-grid transformer between coil and amplifier input. In fact, a high-impedance pickup coil can be made by removing the core from an old interstage audio transformer and connecting the secondary terminals of the winding directly

to the mike input. Shunt the coil with a 270,000-ohm resistor for better frequency response. The magnetic field that such coils pick up comes from a small transformer inside the phone box.

Monitors of this sort are fun as well as being useful; but don't abuse other peoples privacy, and don't record a conversation without permission, or without using equipment that puts the "beep" signal on the line as required by law.

-50-



- B1—Three "Penlite" cells (Type K) in series
- B2—One "Penlite" cell (Type K)
- C1—10 μ fd. electrolytic capacitor, 6-volt or any higher rating
- C2—0.1 μ fd. paper capacitor, 100-volt or any higher rating
- J1—Phone jack, open-circuit type
- R1—4700 ohm, $\frac{1}{2}$ -watt resistor
- R2—10,000 ohm, $\frac{1}{2}$ -watt resistor
- R3—22,000 ohm, $\frac{1}{2}$ -watt resistor
- R4—100,000 ohm, $\frac{1}{2}$ -watt resistor
- S1—D.p.s.t. toggle switch
- V1, V2—Type CK722 transistor
- 1—Pickup coil, 650 turns No. 30 enamel wire bunch-wound on $1\frac{1}{2}$ " dia. form
- 1—Pair of magnetic headphones, high-impedance type (2000 to 8000 ohms)

Wiring schematic of unit with parts list.

Readers who do not care to wind their own coils may find it worthwhile to experiment with the "telephone pickup coil" (Catalog No. 99S478) advertised by the Allied Radio Corp. This coil would appear to be a manufactured duplicate of the unit described in the text. It is currently sold for about \$4.00.