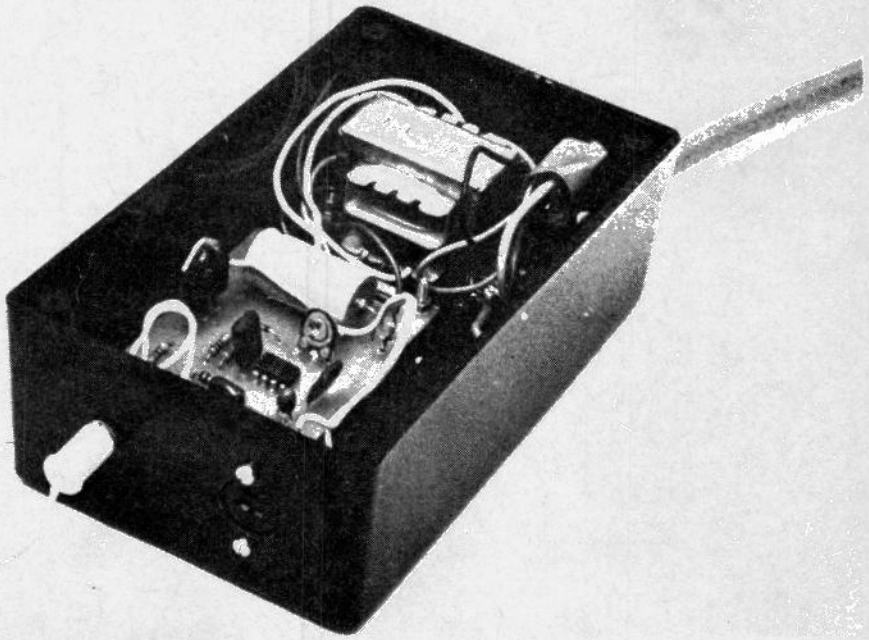
Telephone Bell Extender

This simple project allows you to leave the phone unattended as you move about the house.



MANY TIMES WHILE you're working in the garden the phone may ring and by the time it is heard, if it is at all, it is often too late to reach the phone.

This bell extender will allow you to hear, without touching the phone, an external bell, buzzer or speaker anywhere it is desired. When using a horn loaded speaker the sound level is high enough to be heard over high ambient noise making it ideal for the industrial environment.

ADJUSTMENT

There are two controls to be set, these being sensitivity and volume. The volume can be set first by rotating RV1 until the tone starts then adjusting RV2 to give the desired volume. To adjust the sensitivity first tape the sensor coil to the underside of the phone and then adjust RV1 until the sound stops. Note however that it should be rotated slowly as C3 gives a delay on switch off. Check that picking up and replacing the phone does not operate the alarm then have someone phone you to check that the phone signal does. It may be necessary to experiment with the position of the pickup coil to get the best results.

CONSTRUCTION

While any construction method could be used we recommend that the PC board be used and the overlay in Fig.3 followed. The pickup coil was made out of 0.125 mm enamelled wire, although the gauge is not important, with about 200 turns wound in a circle about 50 mm diameter. The wires can then be terminated to some thin plastic insulated wires (twin "speaker" wire is ideal) and then the complete coil wrapped with plastic insulation tape.

We built our unit into a small plastic box using an external speaker. The unit can be mounted anywhere suitable, taking care however with the 120V wiring. The speaker used will depend on the volume required with a large speaker producing more sound. If a horn speaker is used a very high sound level can be produced.

If it is required only to operate a buzzer the second IC can be altered to be an on-off device by deleting C5, R5, R6, D2 and RV2 and placing a jumper where C5 was.

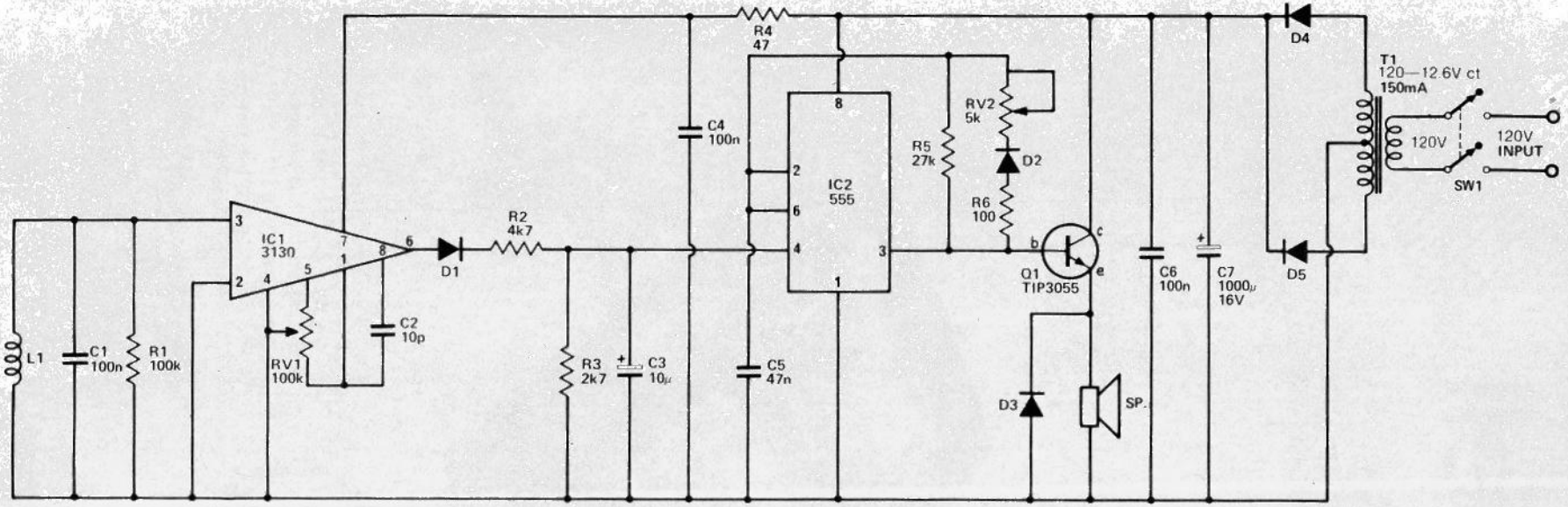


Fig. 1. Circuit diagram of the bell extender.

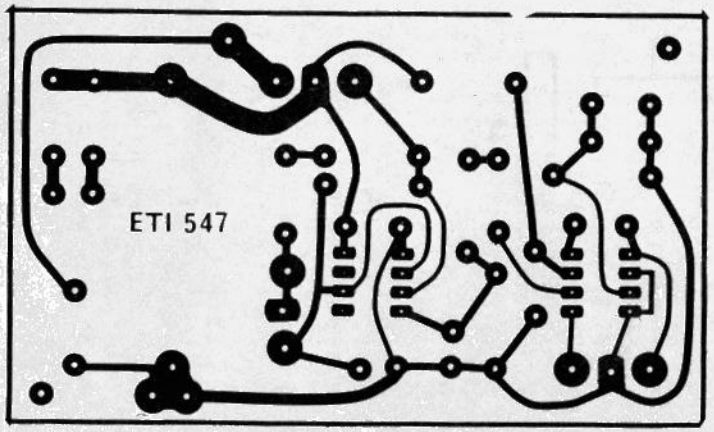


Fig. 2. Printed circuit layout.
Full size 91 x 53 mm.

HOW IT WORKS

Inside the telephone there is a solenoid which operates a striker which hits a pair of bells to give the ring tone. When it operates there is a high magnetic field generated and we detect this field to give the indication that the bell is ringing. To do this we use a wire coil under the telephone and use an IC to detect the presence of a signal. IC1 has its offset voltage adjusted by RV1 such that a slight positive voltage is needed to make the output go high. It is used in the open loop mode as a comparator only. The capacitor C1 is used to remove the unwanted higher frequency signals.

The oscillator used to operate the speaker is simply a 555 timer with a TIP3055 to buffer the output. The frequency is determined by C5 and the volume by RV2. Changing the volume does change the frequency slightly. Oscillation can however only occur if the voltage at pin 4 is greater than 0.6V. If the output of IC1 is low, R3 ensures that pin 4 is less than this voltage. However when the bell rings the output of IC1 oscillates high and low in time with the ring tone of the bell. This lifts pin 4 high, allowing IC2 to oscillate and C3 holds pin 4 for a short time to prevent the oscillator turning on and off at the ring tone frequency.

The power supply is a simple full wave rectifier with no regulation with IC1 being decoupled further by R4 and C4. Batteries could be used but the drain is reasonably high.

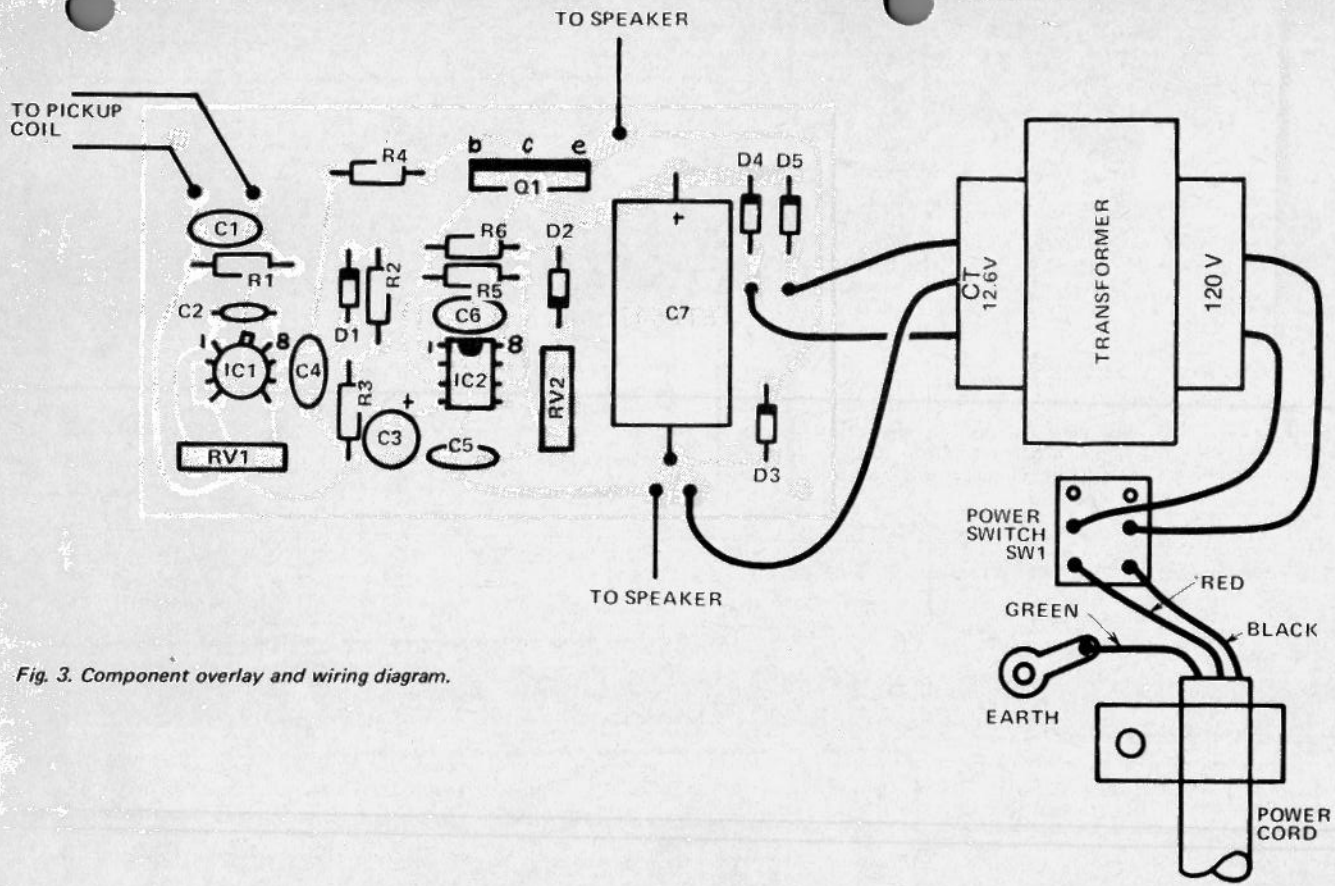


Fig. 3. Component overlay and wiring diagram.

PARTS LIST

Resistors all ½W 5%

R1	100k
R2	4k7
R3	2k7
R4	47
R5	27k
R6	100

Potentiometers

RV1	100k trim
RV2	5k trim

Capacitors

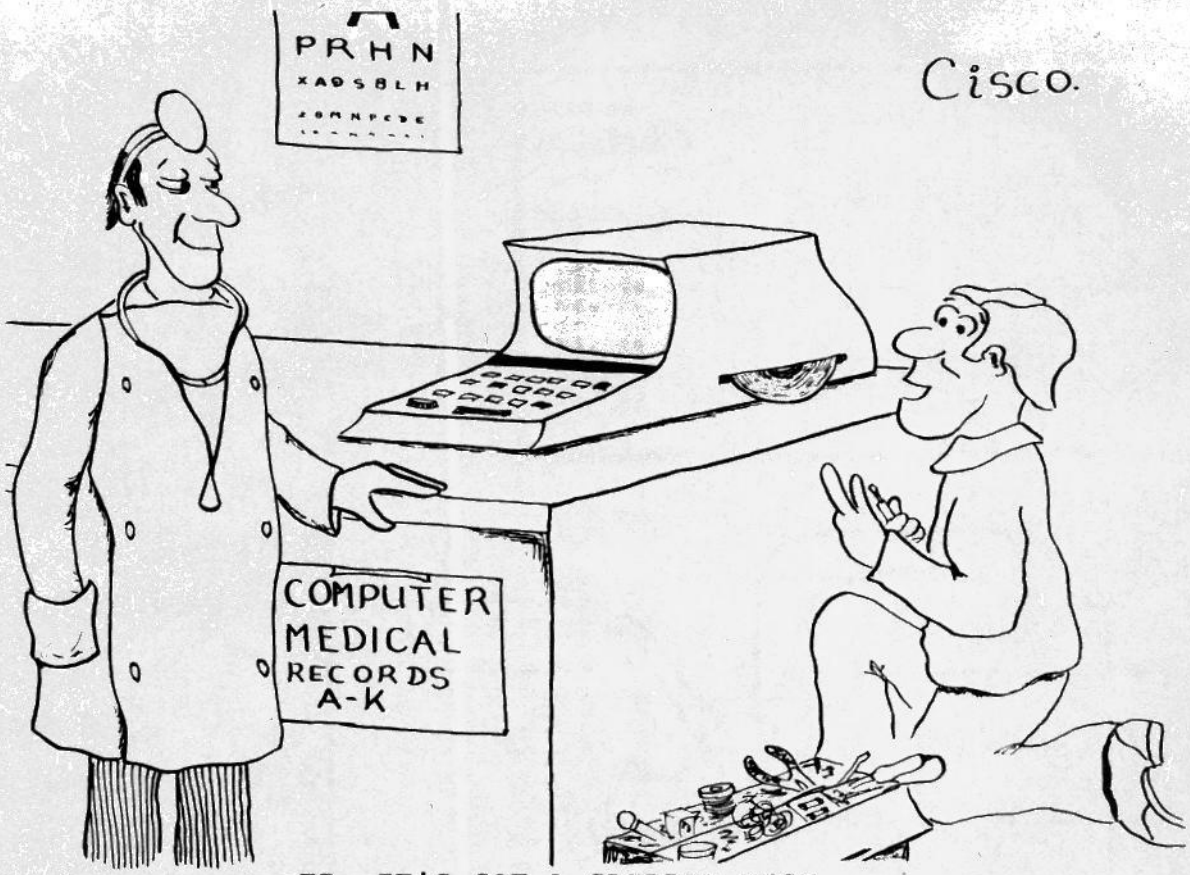
C1	100n polyester
C2	10p ceramic
C3	10μ 16V electro
C4	100n ceramic
C5	47n polyester
C6	100n ceramic
C7	1000 μ 16V electro

Semiconductors

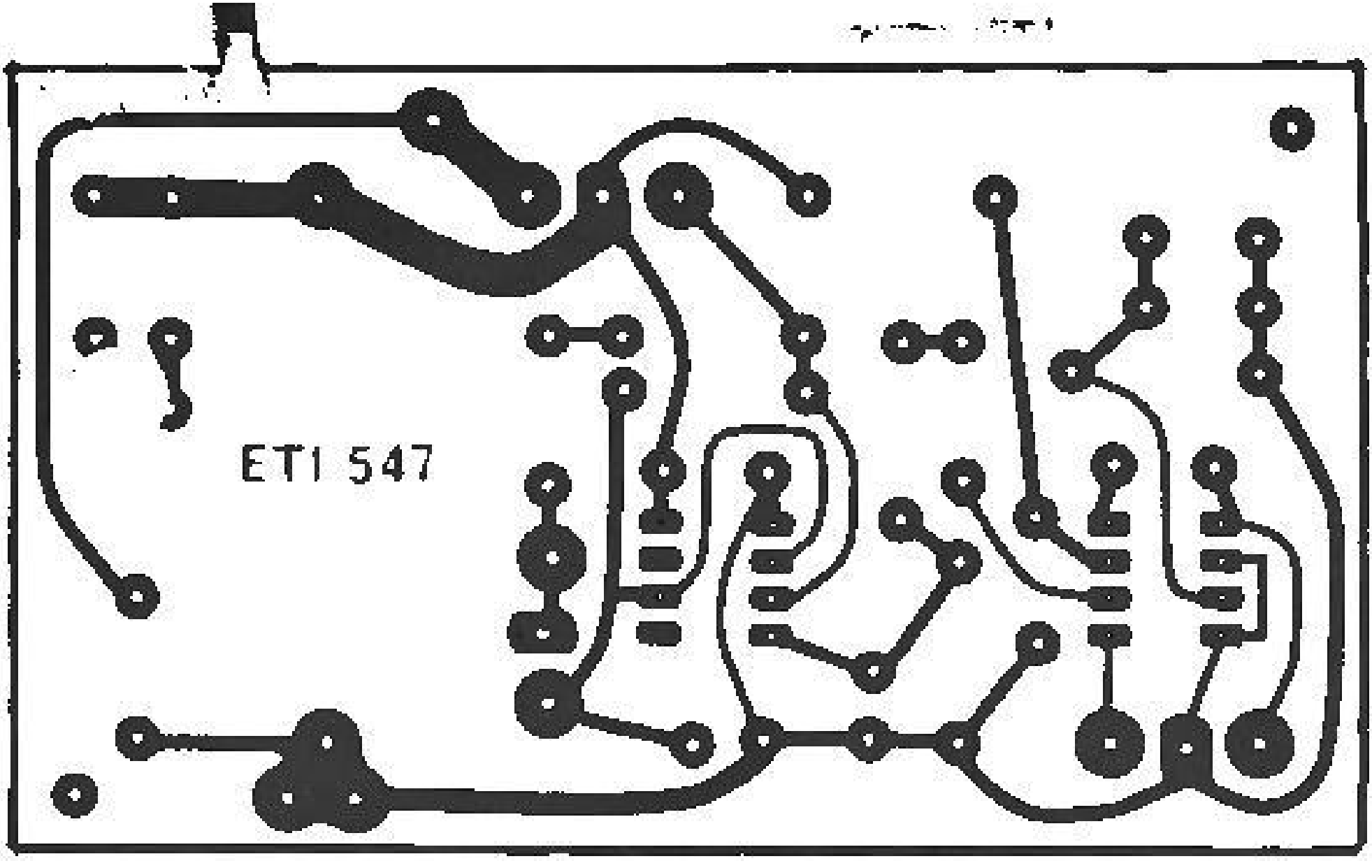
IC1	CA3130
IC2	NE555
Q1	TIP 3055
D1-D5	1N4001

Miscellaneous

PC board
Transformer 120V — 12.6 V ct
On/off switch, line cord
Box, speaker, pickup coil



ER, IT'S GOT A SLIPPED DISK ...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