

A Simple Telephone Tester

By G8MNY

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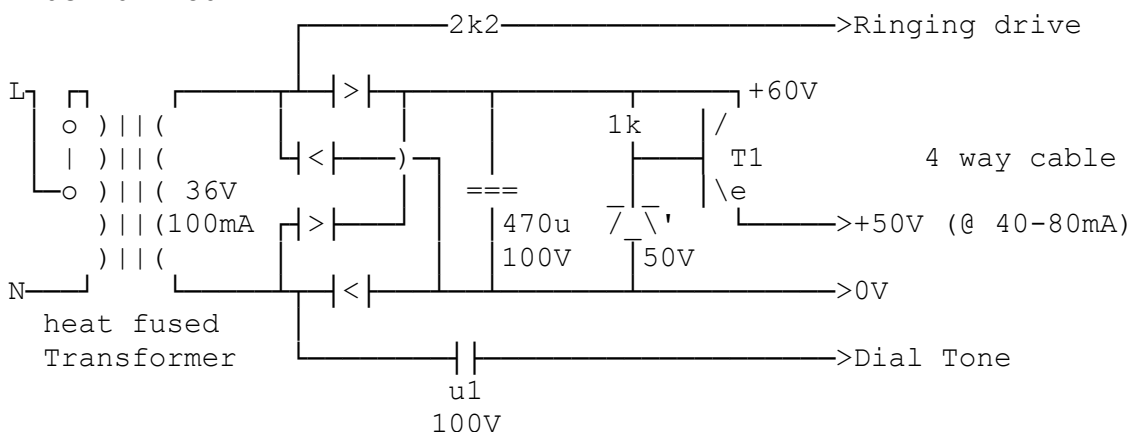
(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

Ever needed to test the functions of a pair of Phones Answering machine, FAX, Modem etc. without 2 telephone lines? This is a simple tester I knocked up in a dual phone socket, plus a plug top PSU, to mimic most telephone line functions.

FEATURES

- PHONE 1 "off hook" can listen to dial tone
- Manual ringing of PHONE 2
- PHONE 2 "off hook" removes dial tone from PHONE 1
- PHONE 1 "on hook" causes line reversal to PHONE 2 (release the call test)
- Variable line loss
- Line status LED indicators

PLUG TOP PSU

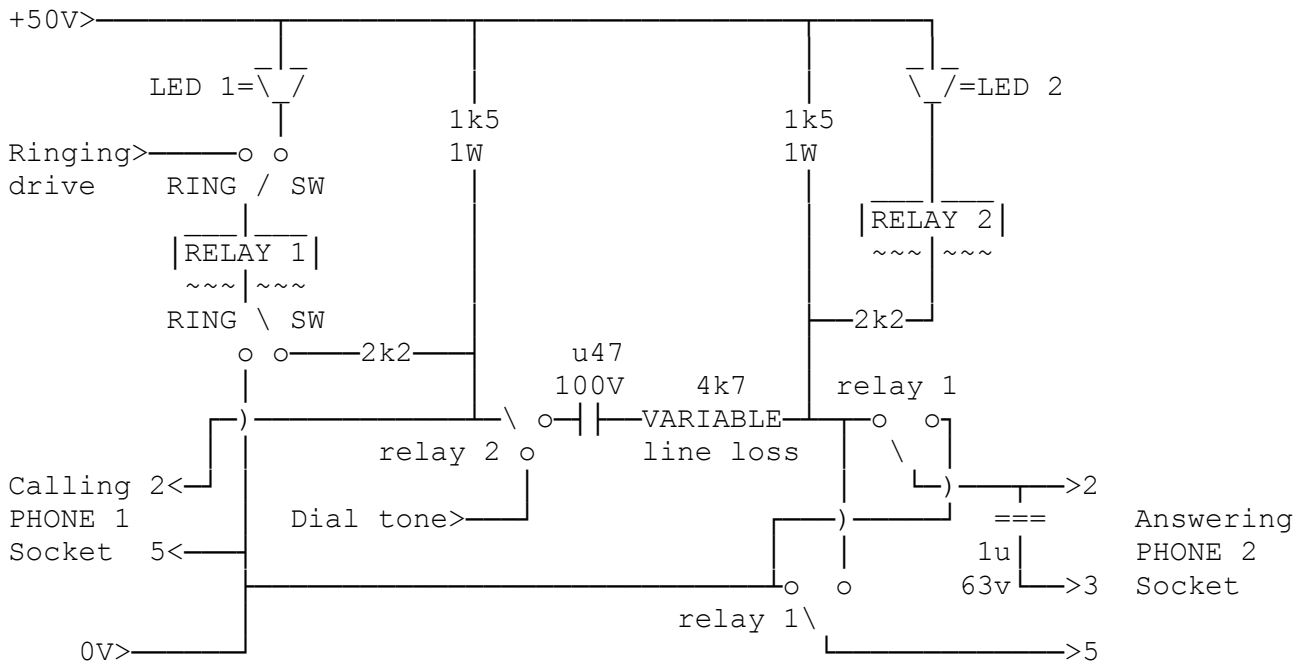


The 50V 1W zener is actually series of zeners, T1 is any 200mA 100V 2W NPN.

The transformer's AC voltage is not high enough to ringing a phone directly, so it is used to drive a line reversing relay to make the ringing.

A small u1 capacitor takes off some of higher harmonics of the AC to mimic dial tone.

TEST CIRCUIT



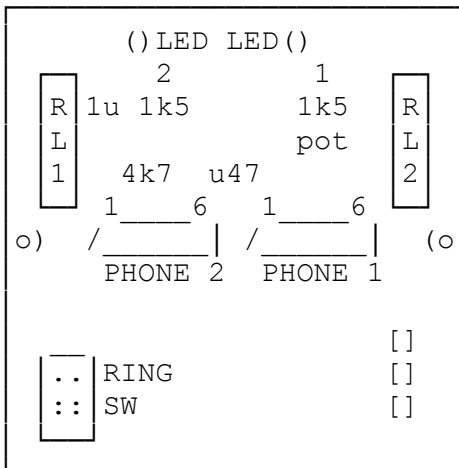
Both relays are double changeover (only 1 needs to be) 28V 7mA DIL type, with 4k coil resistance, note some types may have internal diodes so polarity may matter! During ringing RELAY 1 has to operate & release 50 time a seconds to deliver +/- 50V to PHONE 2 to look similar to the 75V AC (17-25Hz) + 50V DC of real telephone ringing.

The manual RING Switch is a non locking double pole changeover.

Line loss & matching is all approximate, like the real world nothing is 600ohm!

But using 600 ohm test gear & blocking the DC etc. actual line losses could be calibrated on the variable resistor scale (e.g. 10-30dB Max). A more realistic dummy line & noise sources could be used as the middle section if it was important (e.g. for a high speed modem evaluation).

REAR VIEW LAYOUT



The PCB is removed from the case by heating the melted spigots (with a soldering iron).

The PCB needs links cutting to isolate the 2lines if it is a shared phone socket type. The PCB at the switch location is cut away & it is mounted in a drilled front case hole. Tight holes in the case are also made for the LEDs who's wires poke new PCB holes.

After testing reassemble & reheat anything left of the spigots or use some glue.

In UK jack pins 2 & 5 are the 2 wire line, & a 3rd (pin 3) wire may be used for the phones ringer path capacitor normally in the master socket. See your local telecomms Co. (POTS) arrangements if different from UK.

PHONE CALL SIMULATION

- 1/ Connect 2 PHONE devices.
- 2/ Lift PHONE 1, LED 1 lights up, listen to buzzing dial tone & U have "Blow".
- 3/ Intermittently operate ringing switch (concadance ringing).
- 4/ Does PHONE 2 ring? (LED 2 lights dimly to ringing) Can it answer the call?
- 5/ On answer, LED 2 lights, PHONE 2 has "Blow", & PHONE 1 dial tone disappears & a transmission path to PHONE 2 is made.
- 6/ Can you talk or send data both ways over transmission paths, is loss OK?
- 7/ Clear down PHONE 2, LED 2 goes out, & dial tone is returned to PHONE 1.
- 8/ If you cleared down PHONE 1 first instead, then PHONE 2 gets a line polarity reversals, which should cause automatic kit to hang up & clear the line for the next call. I found some kit just times out instead!

REAL PHONE TONES

DTMF-Telephone Standards Touch-Tone dialing

Touch-tone was a registered trademark of AT&T. It is also known as dual-tone multiple frequency (DTMF) signaling!

The two tones in a 4 x 3 keypad matrix, a low-frequency tone & a high frequency tone, to specify 1 of the 16 options. Pressing 2 keys in the same row/column, normal results in a single tone. The 2 tones must not clip & mix as the DTMF Rx IC uses the presence of more than 2 tones the identify the signal non DTMF & ignores it.

TONE HIGH 1209Hz 1336Hz 1477Hz (1633Hz)

LOW

697 Hz	1	2	3	(A)
770 Hz	4	5	6	(B)
852 Hz	7	8	9	(C)
941 Hz	*	0	#	(D)

Level each tone: -6 to -4 dBm
Maximum difference in levels: 4 dB
Maximum level (pair): + 2 dBm
Frequency tolerance: $\pm 1.5\%$
Pulse width: 50 msec
Time between digits: 45 msec minimum

DIAL TONE: 350-440 Hz

BUSY TONE: 480-620 Hz, with 60 interruptions per minute

EQUIPMENT ENGAGED TONE: sounds like busy tone, but slightly different!

RINGING TONE: 440-480 Hz, 2sec on, 4sec off

RINGING VOLTAGE: 17-22Hz 75V AC to earth & -50V DC. (155V peak!)
(cacadance) Load AC 1000ohms via a 1.8/0.9uF.

LINE CURRENT: Around 50mA, typically 10V across a phone in use.

Why Don't U send an Interesting Bul?

73 de John G8MNY @ GB7CIP
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