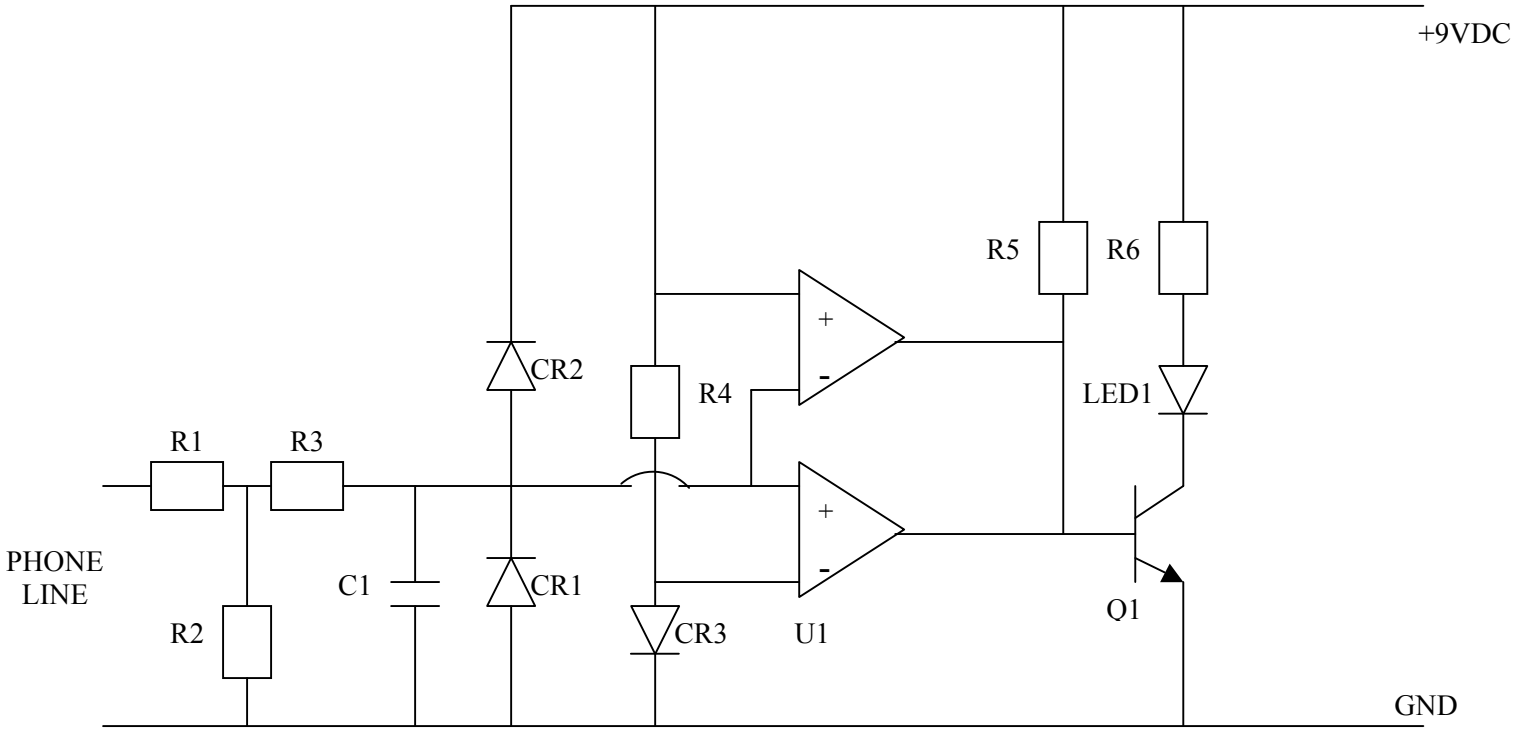

R1,R2	1 Meg
R3	10 K
R4	1 K
R5	4.7 K
R6	470 ohm
C1	.005 uF
CR1-3	1N914 diode
LED1	any old led
Q1	2N2222 or 2N3904
U1	LM339 quad comparator (be sure to connect power and ground)
9VDC	any old 9VDC wall transformer works nicely

Circuit description

R1 and R2 form a voltage divider, insuring that the phone line sees a high impedance load and that high voltages (such as the ring voltage) are easily dissipated by the protective diodes (CR1 and CR2). Also (obviously) they serve to divide all incoming voltages by two. Capacitor C1 filters out some of the audio signals that might otherwise make the LED flicker with speech.

The voltage across a busy line is generally 5-10 volts, whereas a free line sits at more like 48 volts, and a dead line (definitely not in use!) sits at 0. This circuit uses two comparators (sections of U1) to detect when the voltage is either too high or too low. Normally Q1 is kept turned on by pullup resistor R5, keeping LED1 illuminated. If either comparator detects incorrect voltage, its open-collector output goes into saturation and forces Q1 (and thus the LED) off.

The top comparator section has its positive input connected to the +9V supply, so it will force the LED off if the voltage at its positive pin should exceed 9V. Remember that we are dividing by two, so the phone line voltage would have to exceed 18V in order for this comparator to force the LED off. This would normally happen when the phone is not in use (48V, remember?).

The bottom comparator section has its negative input connected to the anode of a forward biased silicon diode, so it is sitting at 0.6V. If its negaive pin is ever lower than 0.6V, this comparator's output will go into saturation and force the LED off. Remember, again, that we are dividing the phone line voltage by two, so the phone line voltage would have to drop below 1.2V in order for this comparator to turn off the LED. This is clearly a dead line.

Serving Suggestion: Install the circuit in an out-of-the-way place, then connect the collector pin of Q1 and the +9VDC to unused (yellow or black) conductors in your home or office phone wiring. Then you can place additional LEDs (with current limiting resistors like R6) at each phone. I once used a power transistor for Q1 and peppered our electronic repair shop with LEDs at every workstation.