

CIRCUIT NOTEBOOK

Interesting circuit ideas which we have checked but not built and tested. Contributions from readers are welcome and will be paid for at standard rates.

Knightrider LED Scanner

This is one of those "useless" novelty projects that is a lot of fun. It scans a row of light emitting diodes back and forth. It could be placed in the front of a radio controlled car, a skateboard or on the front of a child's bicycle.

Most readers will have no doubt seen or at least glimpsed the American television series "Knightrider". The hero of the program is a computerised car which is even more clever than Lassie. Various called "Knight 2000" or "Kitt", the car has a row of red lights at the front which supposedly scan the area in front of it.

This circuit provides the same light scanning effect. It scans 20 light emitting diodes (LEDs) back and forth in quite an intriguing manner. It uses two cheap and readily available ICs, a 555 timer and a 4017 decade counter.

The idea for this project came from a reader who suggests it both as a novelty and as a visual

deterrent to thieves. It could also be used as a back-up to real burglar alarms.

IC1, a 555 timer, is wired as a conventional astable multivibrator which oscillates at about 6Hz. The square wave output from pin 3 of the 555 timer is

then fed to the clock input of IC2.

IC2 is a decade counter and as it counts the clock pulses at its pin 14, each of its outputs go high

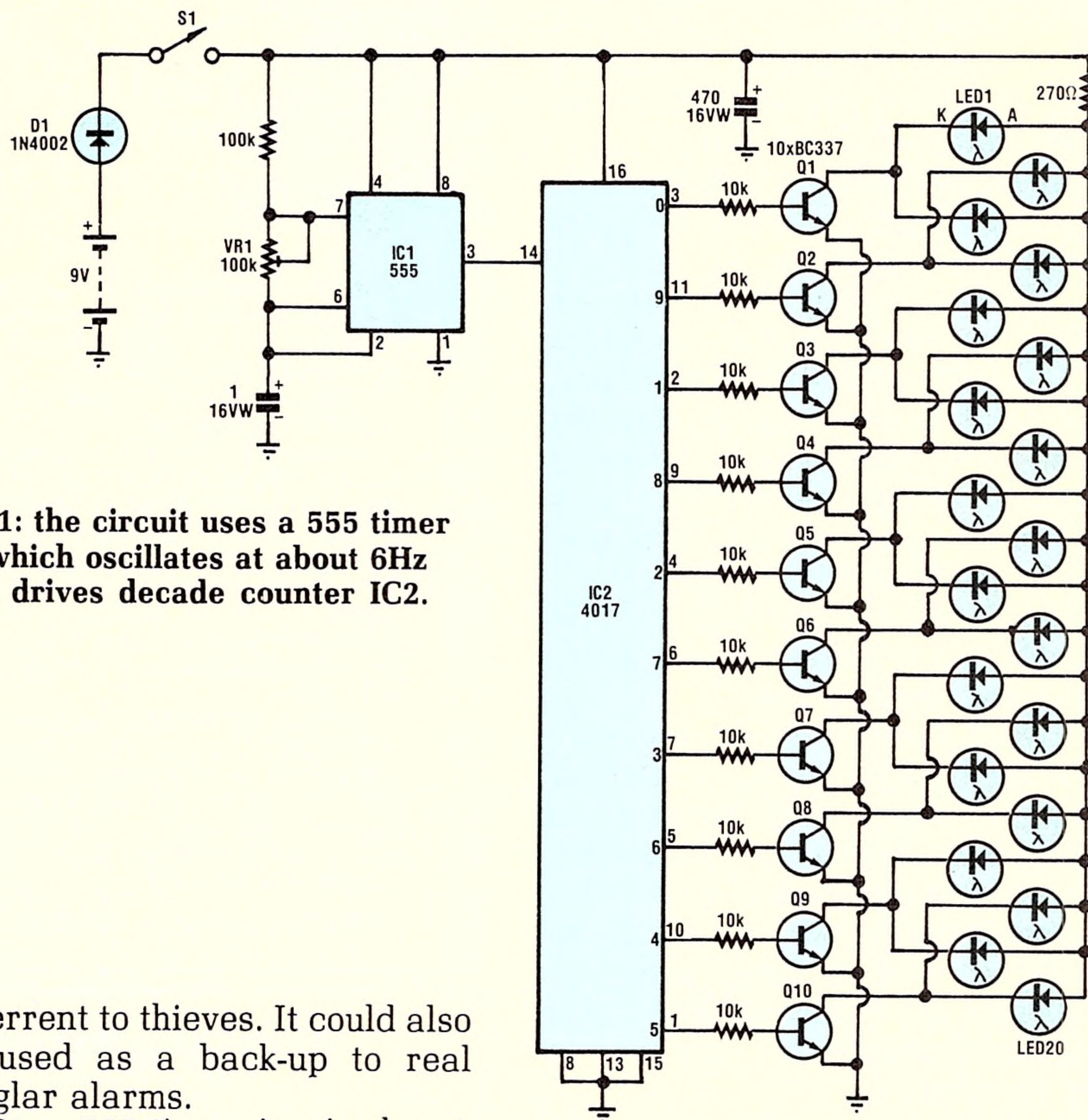


Fig.1: the circuit uses a 555 timer IC which oscillates at about 6Hz and drives decade counter IC2.

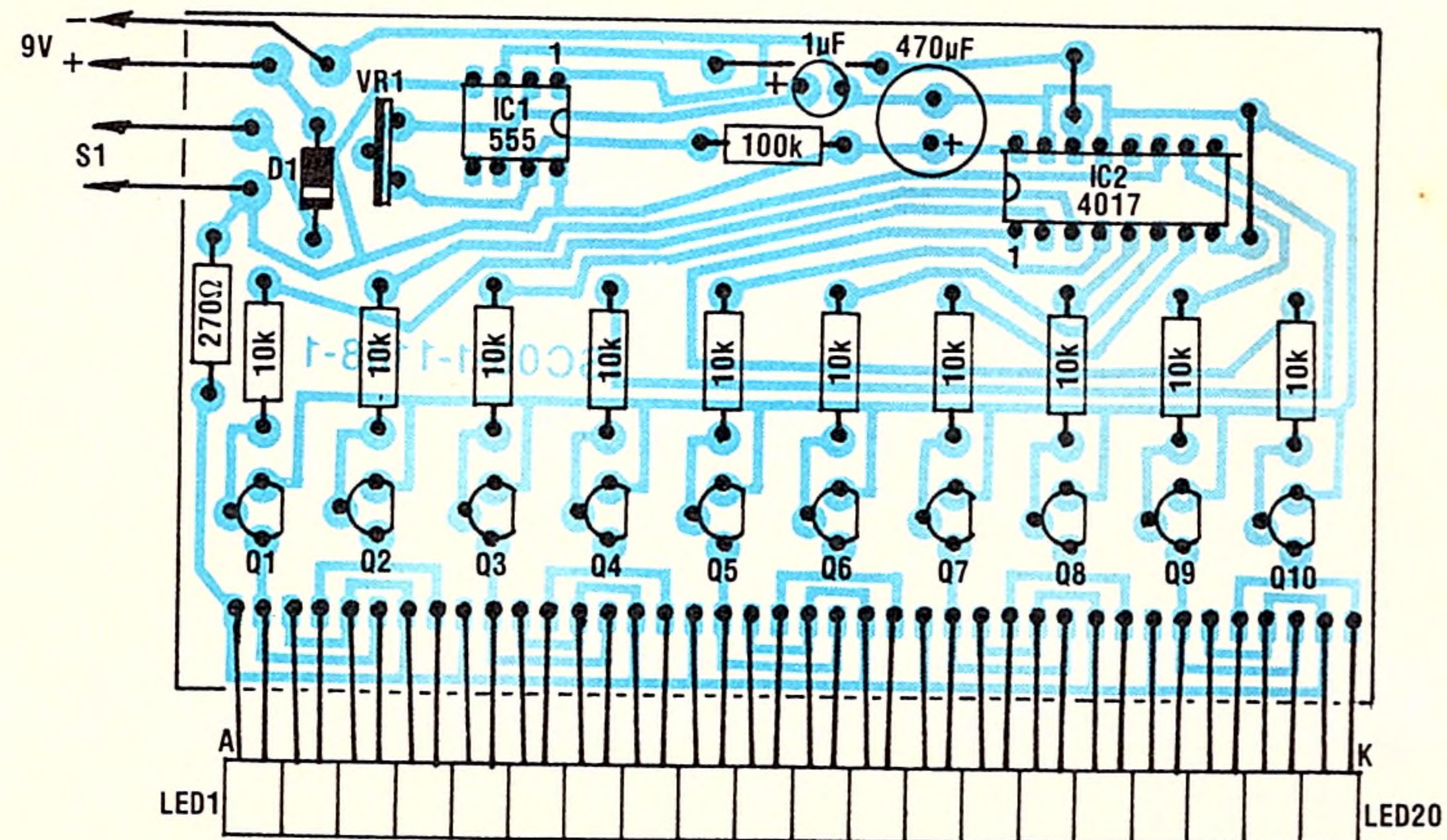


Fig.2: here's how to wire up the PC board for the Knightrider. Be sure to install the ICs the right way around.

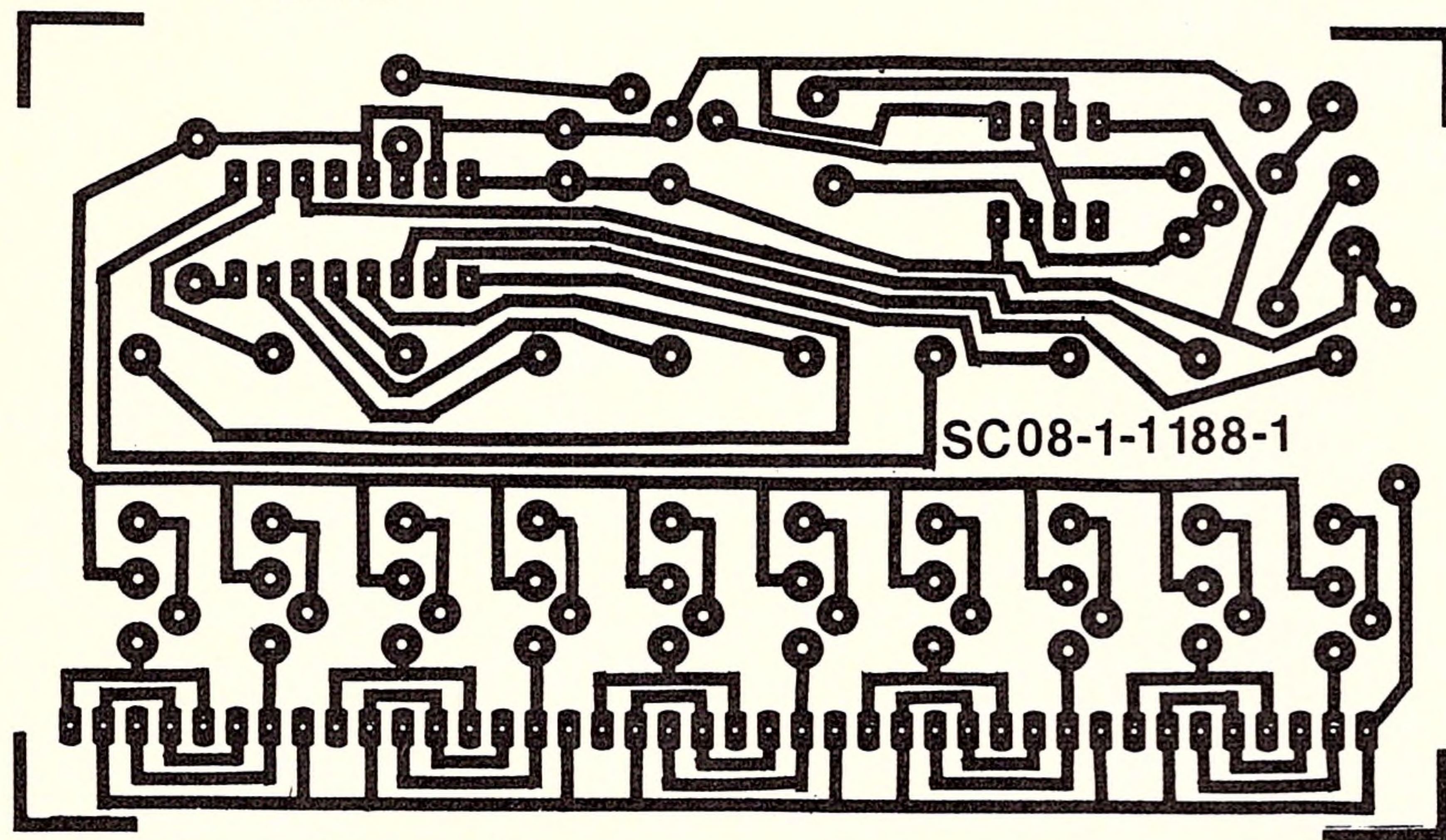


Fig.3: use this actual-size pattern to etch your own PC board.

in turn, for one clock period. As each output goes high, it turns on an associated transistor and two light emitting diodes.

This counting process goes on continuously so that IC2 cycles its ten outputs from 0 to 9 repeatedly.

PARTS LIST

- 1 printed board, SC08111881, 106 x 59mm
- 1 SPST toggle switch
- 1 555 timer
- 1 4017 CMOS decade counter
- 10 BC337 NPN transistors
- 20 rectangular red LEDs
- 1 1N4002 silicon diode
- 1 470 μ F 16VW electrolytic capacitor
- 1 1 μ F 16VW electrolytic capacitor
- 1 100k Ω 0.25W resistor
- 10 10k Ω 0.25W resistors
- 1 270 Ω resistor
- 1 100k Ω trimpot

Well that explains how the two ICs work together but it does not explain how a pair of LEDs is "scanned" back and forth. The 4017 can only count in one direction (ie, 0 to 9) so how do the LEDs go back and forth? The answer is that the outputs of IC2 are connected in such a way that the transistors are turned on in the following order: Q1, Q3, Q5, Q7, Q9, Q10, Q8, Q6, Q4, Q2, and Q1. The cycle is then repeated.

Each transistor drives a pair of LEDs but connected in such a way so that another undriven LED is interposed. The circuit and the wiring diagram of the printed circuit board shows how this is done.