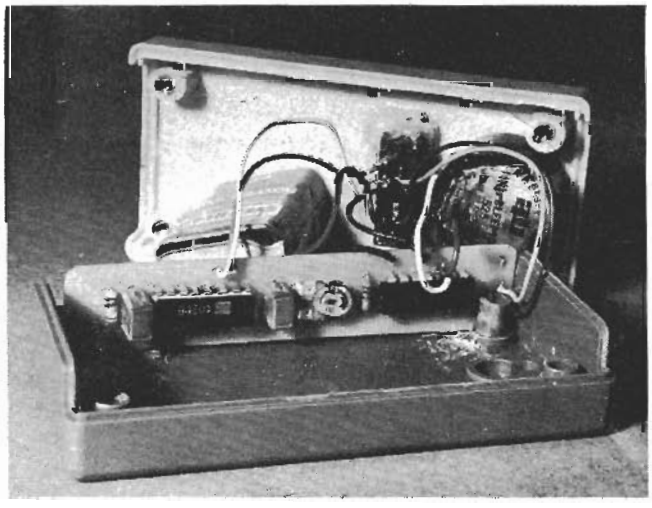
PARKING METER TIMER

Avoid expensive parking fines with our pocket-sized warning bleeper

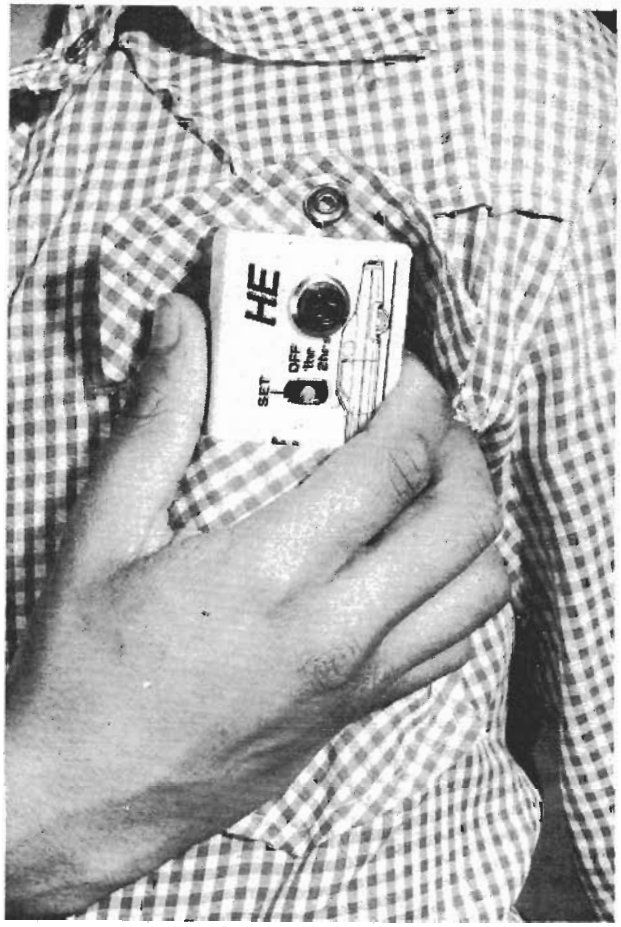
HAVE YOU EVER returned to a parking meter just in time to see a green hornet slap a ticket on your jallopy windshield? If so, our parking meter timer will help ensure that that experience never happens again. It does so by sounding a loud 'beeping' alarm signal several minutes before your parking time is up, thus giving you time to sprint back to the parking zone and feed another coin into the meter just before your 'legal' time expires.

The timer uses just two CMOS integrated circuits and half a dozen discrete components and is small enough to fit comfortably into a shirt pocket. To use the unit, you simply select either a one hour or two hour parking period via a slide switch when you first feed the meter after initially parking the car: this automatically switches the timer on. Then slip the timer unit into your pocket and forget about it.

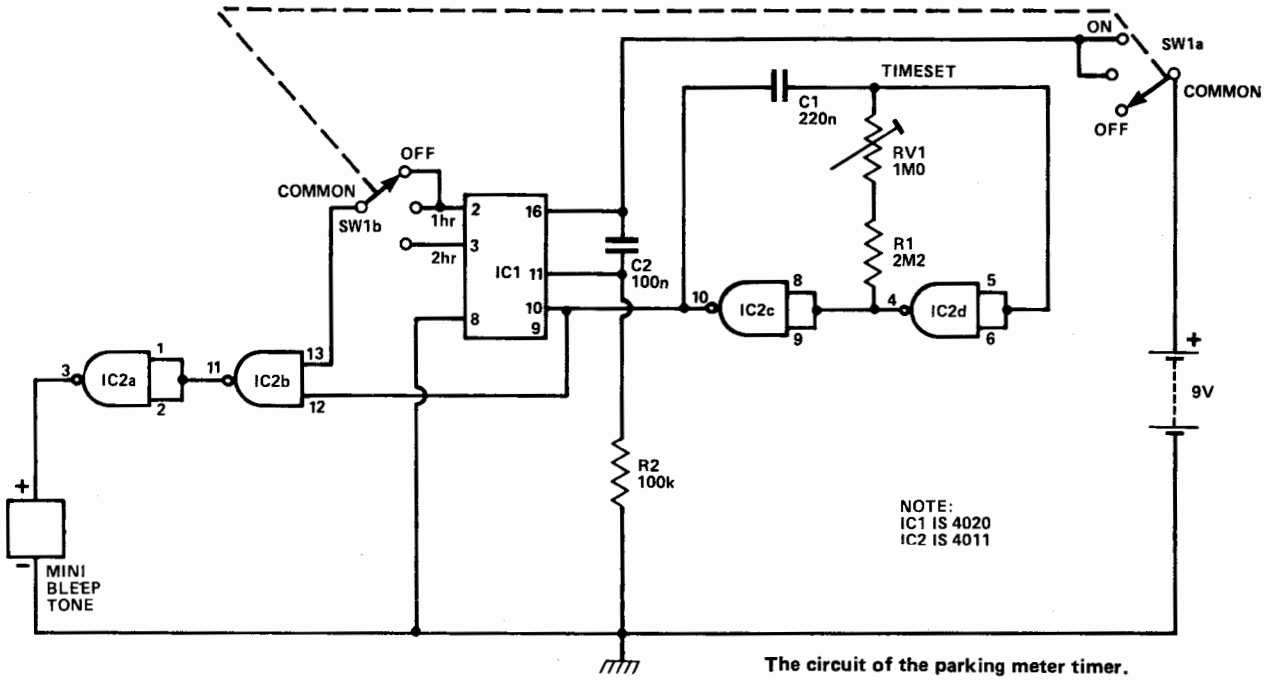
A few minutes before the expiry of your selected parking time, the timer automatically emits a loud 'times-nearly-up' beeping alarm sound. This sound is loud enough to be heard in a noisy room, even when the unit is pushed into an inside pocket. Once the alarm has sounded, you can turn the unit off via its slider switch. The parking meter timer costs only a few bucks to build, but could save you a lot of money from parking fines.
fines.



Internal view of timer showing how the PCB is fitted.



The Parking Meter Timer is small enough to fit in a shirt pocket.



The circuit of the parking meter timer.

HOW IT WORKS

The two integrated circuits used in the design are CMOS devices. IC1 is a 4020 14-stage ripple carry binary counter, and IC2 is a 4011 quad 2-input NAND gate. Two of the NAND gates (IC2c and IC2d) are interconnected as a low-frequency astable multivibrator, with its output feeding to the CLOCK (pin 10) input terminal of the 4020 and to one of the input terminals of the IC2b NAND gate: the second terminal of the IC2b NAND gate is fed from either the 14th (pin 3) counter stage of the 4020, which is normally low but goes high on the 4096th count of the clock, in the '2 hour' position of SW1, or from the 13th (pin 2) stage of the 4020, which goes high on the 2048th count of the clock, in the '1 hour' position of SW1. The output of the IC2b NAND gate is fed to a miniature tone generator module via IC2a, which is connected as a simple inverter. The complete operating sequence of the circuit is as follows:

The unit is switched on by moving SW1 to either the 1 Hour or 2 Hour position. At switch-on a brief reset pulse is fed to pin 11 of the 4020 via the C2-R2 network, and all outputs of this IC go low. The astable 'clock' generator starts to operate as soon as the unit is switched on, but the tone generator is held off because one of the inputs to the IC2c NAND gate is low. At the end of the 2048th clock cycle in the '1 Hour' position or the 4096th clock cycle in the '2 Hour' position, one of the inputs of the IC2b NAND gate is set high by the respective output of the 4020. The tone generator module is then switched on whenever the output of the clock generator goes high, and thus produces a 'bleep' signal.

In use, the timer can be set to produce either precise 1 and 2 hour periods, or periods that are a few minutes short of these times, by adjustment of the RV1 'set time' control.

Construction

The most important thing to remember about this project is that, to be of real practical value, it must be small enough to fit comfortably in a shirt pocket, so that you can use it even in the warmest weather. With this in mind, we've taken a lot of trouble over miniaturisation.

The housing that we've chosen for the project is a Type 65-2514F Verocase, which is just large enough to house all of the components. Even so, it is necessary to cut away part of the pillars along one side of the case, to accommodate the PCB and its components.

Slide switch SW1 should be recessed into the front of the case, so that it doesn't get accidentally switched off when the unit is in use. We achieved this by cutting a small slot in the front cover and fixing the switch into position from the rear by using layers of epoxy adhesive to set the switch at the correct height.

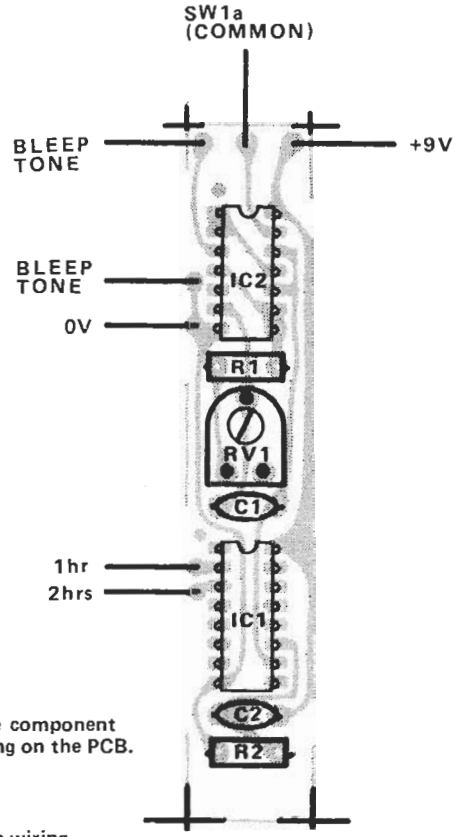
Take Precautions

Note when assembling the PCB that miniature poly-carbonate capacitors are used for C1 and C2, and also that sensible precautions must be taken when soldering the two CMOS IC's into place. The wiring of SW1 to the PCB should be done with special care. When construction of the timer unit is complete, it can be calibrated as follows.

Calibration

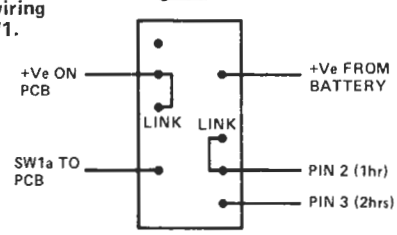
Temporarily disconnect the lead to the 'common' tag of SW1b and connect the lead to the positive supply rail. Switch the unit on. The unit should now produce the 'bleeping' tone. If you want the unit to give precise one hour and two hour timing periods, adjust RV1 to give 68.3 bleeps per minute. If, on the other hand, you want periods of 1 hour 50 minutes (to give you the 'times-nearly-up' warning), set RV1 to give 74.5 bleeps per minute. That completes the calibration, and you can now reconnect the lead to the common tag of SW1b, and put the unit to practical use.

As a final point, you may care to note that you can get timing periods of ½ hour or ¼ hour from the unit by connecting SW1b to pin 1 or pin 15 of IC1, if you so wish.



The component siting on the PCB.

The wiring of SW1.



PARTS LIST

RESISTORS. (all ¼w 5%)

R1	2M2
R2	100k

CAPACITORS

C1	220n polycarbonate
C2	100n polycarbonate

POTENTIOMETER

RV1	1MO preset

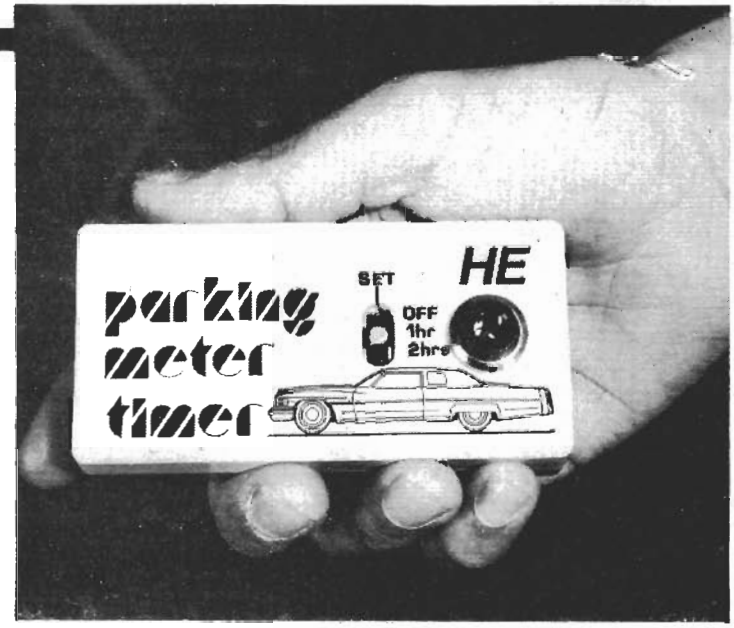
SEMICONDUCTORS

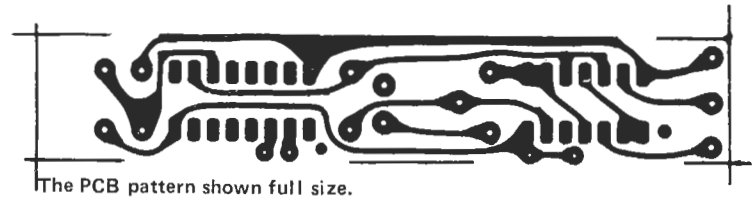
IC1	4020
IC2	4011

MISCELLANEOUS

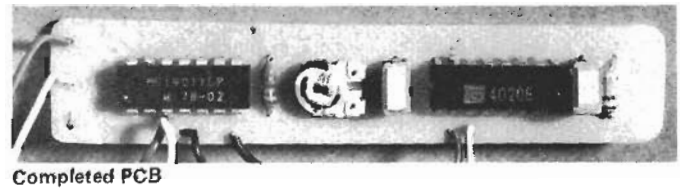
Bleep tone (9V-15mA)

SW1 min. slide three position double pole.
Vero case to suit. PCB





The PCB pattern shown full size.



Completed PCB