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Nowadays you can buy white LEDs, which emit quite a bit of light. They are so bright that you shouldn't look directly at them. They are still expensive, but that is bound to change. You can make a very good solid-state pocket torch using a few of these white LEDs. The simplest approach is naturally to use a separate series resistor for each LED, which has an operating voltage of around 3.5 V at 20 mA. Depending on the value of the supply voltage, quite a bit of power will be lost in the resistors. The converter shown here generates a voltage that is high enough to allow ten LEDs to be connected in series. In addition,

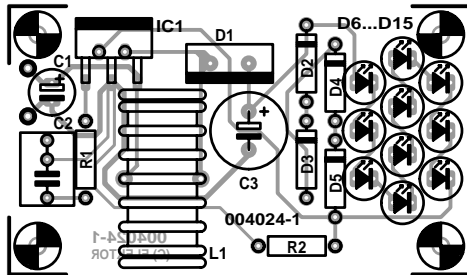
this converter supplies a constant current instead of a constant voltage. A resistor in series with the LEDs produces a voltage drop that depends on the current through the LEDs. This voltage is compared inside the IC to a 1.25-V reference value, and the current is held constant at 18.4 mA ( $1.25 \text{ V} \div 68 \Omega$ ).

The IC used here is one of a series of National Semiconductor 'simple switchers'. The value of the inductor is not critical; it can vary by plus or minus 50 percent. The black Newport coil, 220 µH at 3.5 A (1422435), is a good choice. Almost any type of Schottky diode can also be used, as long as it can handle at least 1 A at 50 V. The zener diodes are not actually necessary,

but they are added to protect the IC. If the LED chain is opened during experiments, the voltage can rise to a value that the IC will not appreciate.

The PCB shown here is unfortunately not available ready-made through the Publishers' Readers Services.

(004024-1)



## COMPONENTS LIST

### Resistors:

R1 = 1k $\Omega$

R2 = 68 $\Omega$

### Capacitors:

C1 = 100 $\mu$ F 16V radial

C2 = 680nF

C3 = 100 $\mu$ F 63V radial

### Inductors:

L1 = 200 $\mu$ H 1A

### Semiconductors:

D1 = Schottky diode type  
PB7R745 or equivalent

D2-D5 = zener diode 10V, 0.4W

D6-D15 = white LED

IC1 = LM2585T-ADJ

(National Semiconductor)

