Low Power Pilot Light

Build yourself this simple circuit to fit inside battery-powered equipment — it will warn you that you have left the equipment on and that you are wasting valuable battery power.

HOW MANY TIMES have you gone to your radio to listen to your favourite program, only to find that the battery is dead because the last time you tuned in you forgot to turn it off? This sort of thing can happen quite often to battery-powered equipment and the chances are you won't have any fresh batteries.

Now, wouldn't it be nice if you could fit a LED pilot light to the equipment to give a visual warning when it has been left on? The problem with such a method is that the current drawn by the LED (about 20 mA) could result in the pilot light using more power than it saves.

A more practical alternative is to use a low power pilot light such as this one. The ETI Low Power Pilot Light flashes a LED for only very short periods, at intervals of about 1s. Because the LED is on for only a small fraction of the total time, the average current consumption is very low. Thus battery life will not be significantly reduced with the use of this project, even if the battery is a small, low capacity type.

A flashing LED pilot light also has the advantage of being more noticeable than a non-flashing type.

Construction

Insert and solder the five resistors into the Veroboard, according to Fig. 2, followed by the two capacitors. Make sure you polarise the capacitors correctly.

Now, mount transistors Q1 and 2, checking before you solder each one in that it is the right way round.

Solder in LED1, the same way round as shown in Fig. 2. Now, bend it down so that it lies in a horizontal line with the Veroboard.

Finally, solder a couple of coloured leads from the corresponding points (red to +9V; black to 0V) long enough to go to the supply points of the equipment into which the project fits.

The circuit board does not need to be fastened down because it is adequately mounted when LED1 is fitted into its panel clip. So, all you need to do now is drill a hole in the panel of your battery-powered equipment to fit the LED panel clip, push in the LED (complete with circuit board) and connect the board to the supply points of the equipment.

PARTS LIST

RESISTORS (All ¼W, 5%)

R1	1M2
R2	100k
R3	18k
R4	10k
R5	1k8

CAPACITORS

C1	1u0, 16V electrolytic
C2	10u, 16V electrolytic

SEMICONDUCTORS

Q1	MPS6515 NPN transistor
Q2	2N3905 PNP transistor
LED1	0.2" red LED + panel clip

MISCELLANEOUS

Veroboard, 8 strip x 11 hole, 0.1" matrix

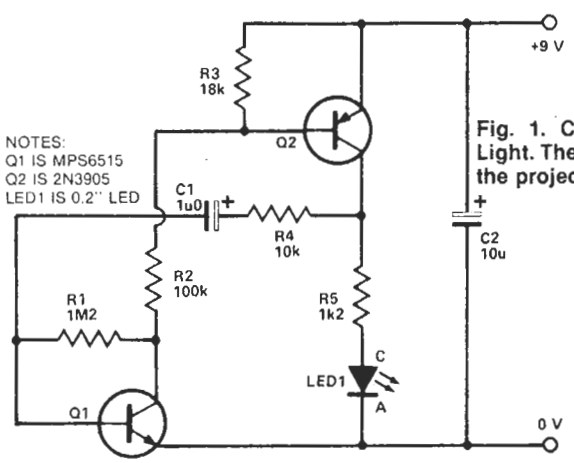

Fig. 1. Circuit of the Low Power Pilot Light. The suggested Veroboard layout for the project is in Fig. 2.

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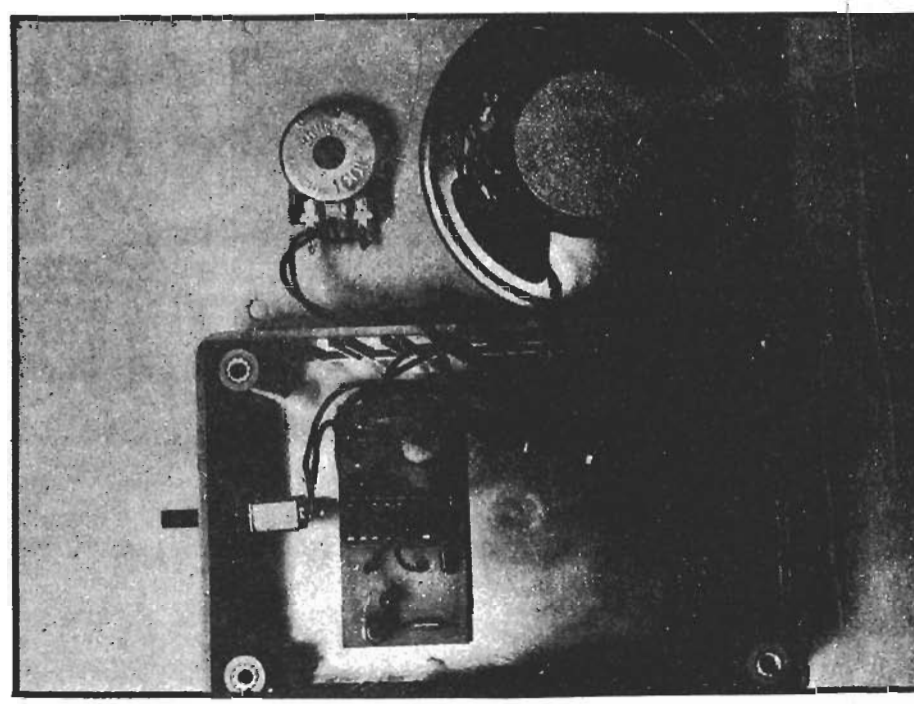
struction techniques: either Veroboard or PCB can be used to build it up. Overlay and connection details are given for them both in Figs. 2 and 3.

When using Veroboard, remember to break the tracks where necessary, as indicated in the underside view of the board in Fig. 2 and check that no short circuits are formed by loose swarf or solder bridges between tracks. Track breaks can be made using either the correct tool or simply a hand-held 1/8" drill bit, by holding it on the hole in question and twisting gently clockwise.

Insert resistors first, followed by capacitors and finally semiconductors. The diagrams show component position and connection details. Follow them carefully, making sure all polarised components are inserted the same way round as indicated.

After connection of the speaker and a suitable power supply, the project should work satisfactorily first time. It then only remains to build the board into a suitable case.



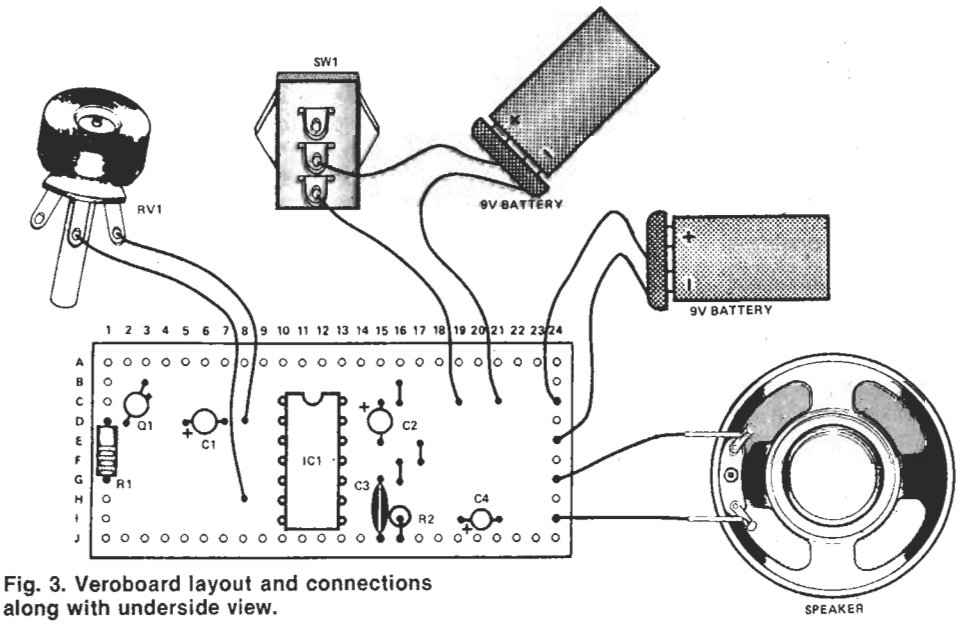


Fig. 3. Veroboard layout and connections along with underside view.

See page 66 for the PCB pattern.

PARTS LIST

RESISTORS

R1	470k
R2	2R7

POTENTIOMETER

RV1	100k logarithmic potentiometer

CAPACITORS

C1	470n, 16V tantalum
C2,3	100n polyester
C4	10u, 16V printed circuit mounted electrolytic

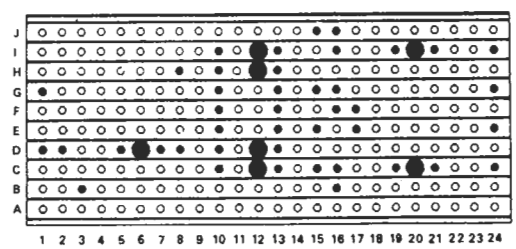
SEMICONDUCTORS

IC1	LM380 2W power amplifier
Q1	MPS6515 NPN transistor

MISCELLANEOUS

SW1	single-pole, single-throw toggle switch

IC socket (14-pin)
Miniature speaker —64R
Batteries and clips



HOW IT WORKS

The heart of this project is none other than our old friend the LM380. The IC has all the necessary circuitry to form an amplifier with over 2W of output power. Of course we don't need all of that power in this application — in fact only ¼ W is ample — but the LM380 remains one of the cheapest amplifier ICs around (regardless of output power) so we stuck with it.

Transistor Q1 forms the noise generator. It is connected in a rather unusual manner (see the circuit diagram in Fig. 1), with its emitter positive relative to its base. In this mode, a transistor is transmogrified into what is essentially a zener diode — a noisy one at that, providing a fairly large amplitude (50 mV) of noise at its base. Integrated circuit IC1 amplifies the noise (RV1 acting as a volume control) to drive the speaker and give the background noise.