

# Luxurious Toilet Bathroom Facility

Aged persons in the house and guests often fumble while searching for the toilet and bathroom switches at night. Also, very few of us take care to switch off the lights of toilets/bathrooms after using them. The circuit given here helps to overcome both the problems. The figure shows two symmetrical circuits (one each for toilet and bathroom) sharing common power supply and a melody generator-cum-audio warning unit. The reed switches S1 and S2 are of normally-open type, operated by permanent magnets appropriately fixed to the doors of bathroom and toilet, respectively. When the doors of bathroom and toilet are closed, the reed switches are also closed, and vice versa. (Door is assumed in closed condition with nobody inside bathroom/toilet, i.e. reed switch is activated.)

## **The operational features of the circuit are:**

- Lamp and exhaust fan are switched on when the door is opened.
- Soft music is played continuously until the door is closed from inside/out side.
- With a person inside the room, lamp and fan remain on, until the door is reopened. They go off when the door is reopened.
- Visual indication of whether the toilet/bathroom is occupied/vacant is given by two bicolour LEDs fixed on a panel, which may be fitted near the door with corresponding 'toilet'/'bathroom' labels on them. Here the LED colour turns from 'green' to 'red' if the room gets occupied, and vice-versa.
- If the door is opened once, and not closed back within 10 seconds, the lamp and fan are automatically switched off, thus conserving electricity. But the music remains on as a reminder that the door is not closed.
- For cleaning of bathroom/toilet with doors kept open, a parallel on/off switch is included on the switchboard to bypass the relay contacts and manually control the switching on/off of the light and exhaust fan. (This is the service mode.) In this case, the music remains on as long as the door remains open. In case of failure of the unit, the same on/off switch can be used as usual until the circuit is repaired.
- Due to battery backup facility, even with power failure, when a person is inside, the door status is maintained. However, the lamp and fan will be on only on mains resumption.
- Also, when a person leaves the room during power failure, with door closed, the lamp and fan are kept off on resumption of power. (Intelligent-mode!)
- However, the circuit can be fooled by opening and closing the door within 10 seconds, without entering inside. In this case, the lamp and fan will continue to be on and would require reopening and closing of the door to bring the circuit to order.

This problem can be prevented to some extent by using a hydraulic door opener, which would approximately take 10 seconds to close the opened door. A delay period of 10 seconds is deliberately chosen for letting the person inside the toilet/bathroom in normal case! IC1 is a dual positive edge-triggered 'D' type flip-flop. IC1(a) gets triggered when bathroom door (and switch S1) is opened and hence IC1(b) toggles, as Q output of IC1(a) is connected to clock input pin of IC1(b). As a result, relay RL1 energises through transistor T3, thereby switching on the lamp and exhaust fan. (Please refer to Fig. 2, the separate wiring diagram of lamp and exhaust fan via the N/O contacts of the relay.)

Simultaneously, pin 2 (Q) of IC1(a) goes low, switching transistor T5 'on', which switches on melody generator IC4, letting out a sweet audio tune via transistor T6 and loudspeaker. In normal condition, when someone opens the bathroom door and gets inside within preset time of IC3(a) (10 seconds here), and closes the door from inside, the music stops with lamp and fan 'on'. Now, in case someone opens the door before or after use, and forgets to shut it, the lamp and exhaust fan are switched off after 10 seconds but the music remains 'on' as a reminder that the door is to be closed.

This happens due to mono multivibrator (MMV) IC3(a), which resets pin 10 of IC1(b) through transistor T1 after 10 seconds. (This period can be adjusted by varying the values of resistor R11 and/or capacitor C7.) It should be noted here that although IC3 is used as 'MMV', it is triggered here with a positive pulse through its pin 4 (reset pin) rather than its pin 6 (trigger pin). This arrangement makes it unique for setting and resetting IC3 through pin 4, and resetting IC1(a) through pin 5 of IC3 and transistor T1. Battery backup facility ensures memory backup during power failure. Power supply uses a normal 2-diode full-wave rectifier circuit, which needs no further explanation.

The purpose of using bi-color LED1 and LED2 is that, initially when the door is closed these emit green light— as the green LED part gets the supply via resistor R15— to indicate that bathroom/toilet is vacant. When bathroom/toilet is occupied, transistor T3/T4 conduct to light up the red LED part as well. Melody generator IC4 (UM66) is switched on through diodes D3/D4 and transistor T5, which conducts when IC1(a) pin 2 or IC2(a) pin 2 goes low. When transistor T5 conducts, zener ZD1 breaks down and supplies regulated 3.9V to IC4, to produce a melodious tune via transistor T6 and the speaker. As most toilets and bathrooms are 'attached' nowadays, only a single circuit is required, and the circuit can be wired on a general-purpose veroboard. A small modification of the circuit, by adding additional SPST switch S3, as shown in Fig. 2, needs to be done inside the wooden switchboard box. This permits the user to operate the lamp and fan during cleaning of the toilet or for bypassing the circuit, when bathroom or toilet undergo repair work.

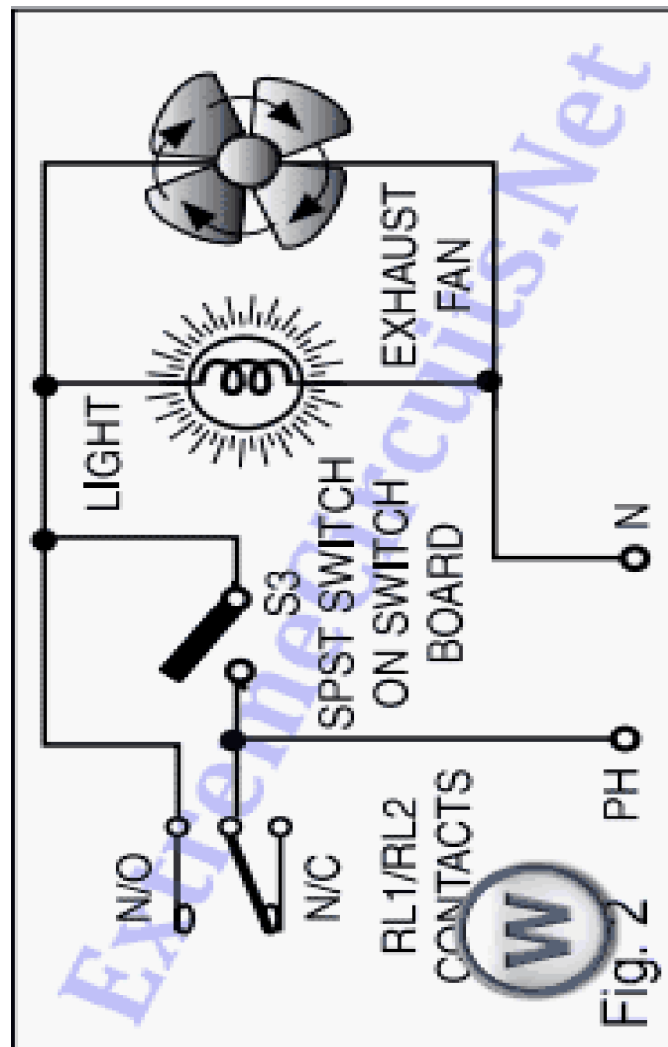


Fig. 2

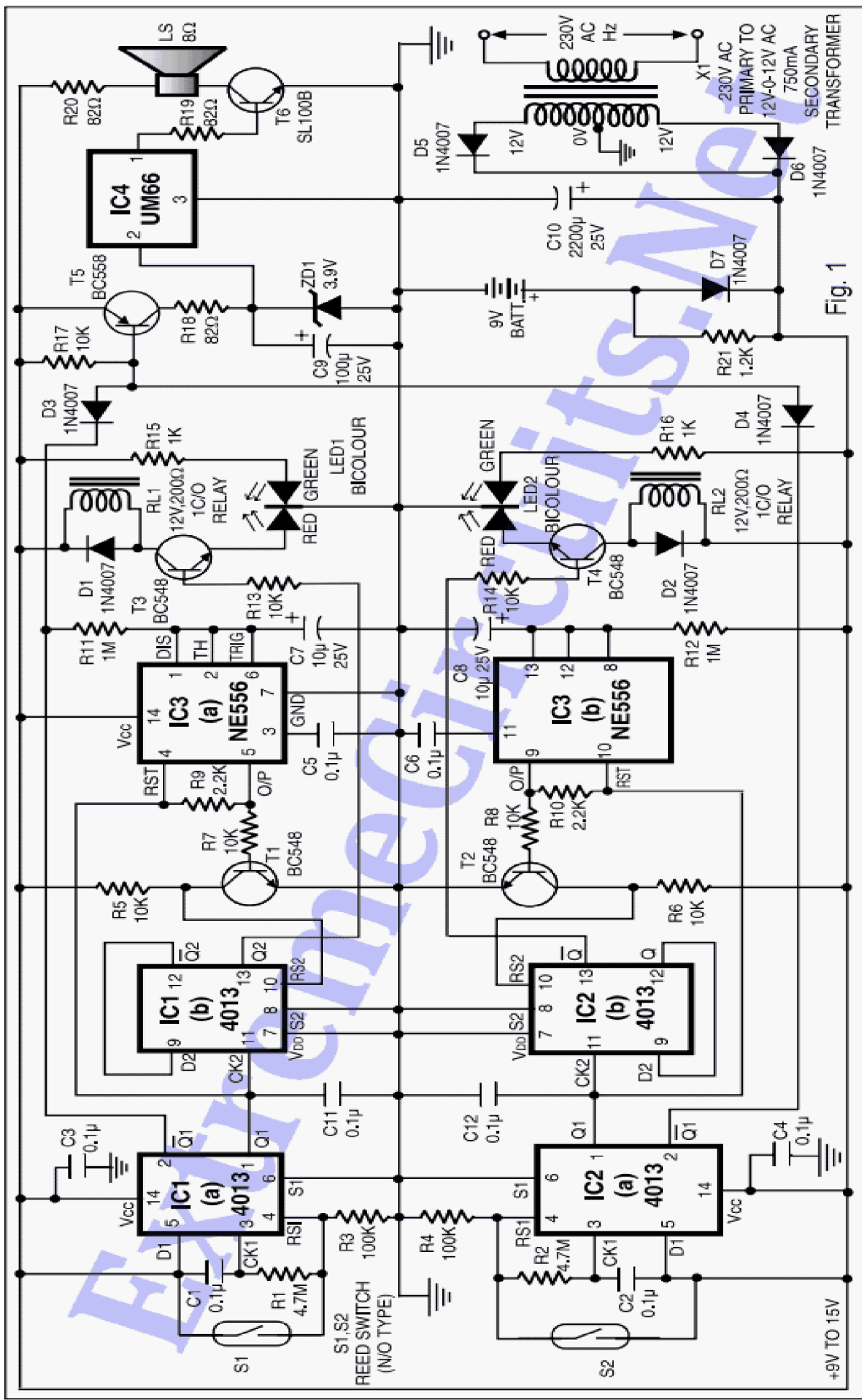


Fig. 1