

NITA

270 MINI ELECTRONICS PROJECT WITH CIRCUIT DIAGRAM



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Try & Do Innovation | Suman Debnath

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This Book is written for all the people who love innovation. It is the big collection of ideas to do some innovative project, to make something new. I believe this Book will be helpful for the students for their mini project. My effort will get success if you get any help like project idea, circuit diagram help from this book. Give your feedback by mailing me.

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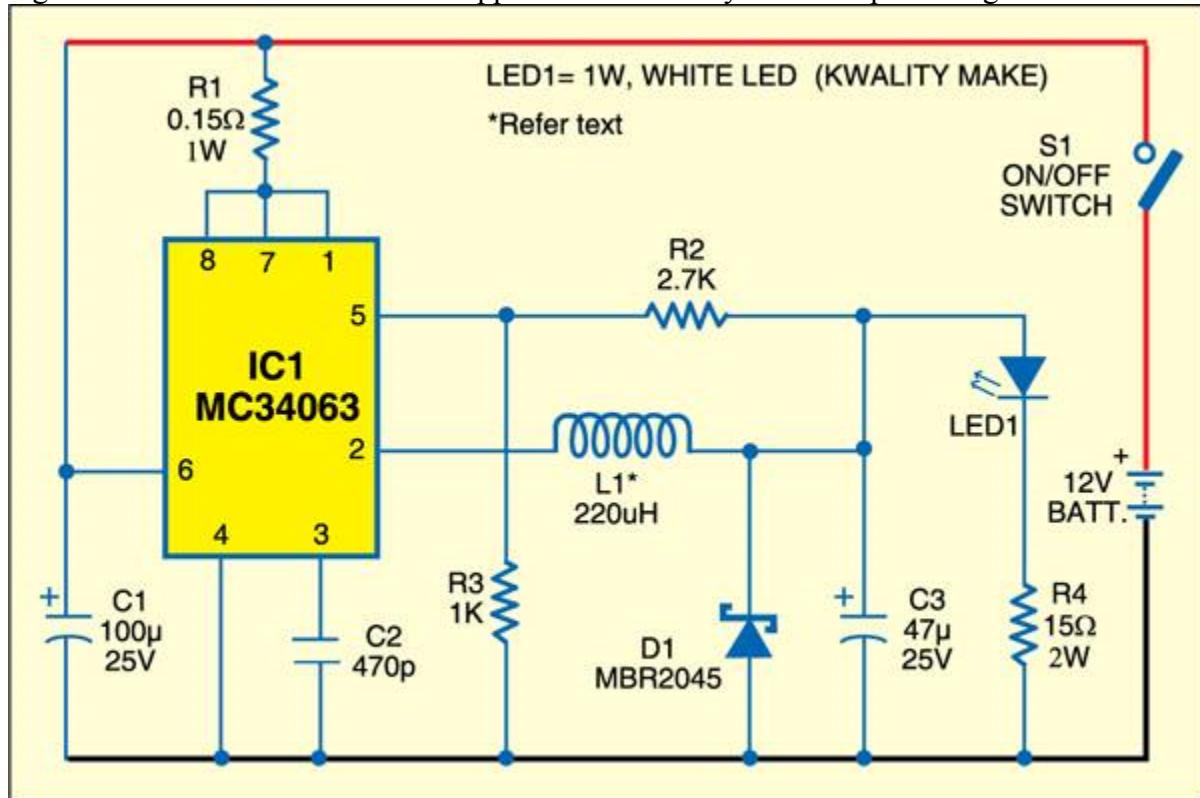
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CONTENT

1. DC-DC Converter

This simple circuit lets you run a 1W LED from the battery of your car. IC MC34063 is used here as a buck converter. It is a monolithic switching regulator sub-system intended for use as a DC-DC converter. The device consists of an internal temperature-compensated reference, a comparator, a controlled duty-cycle oscillator with an active current-limit circuit, a driver and a high-current output switch. These functions are contained in an 8-pin dual in-line package. Another major advantage of the switching regulator is that it allows increased application flexibility of the output voltage



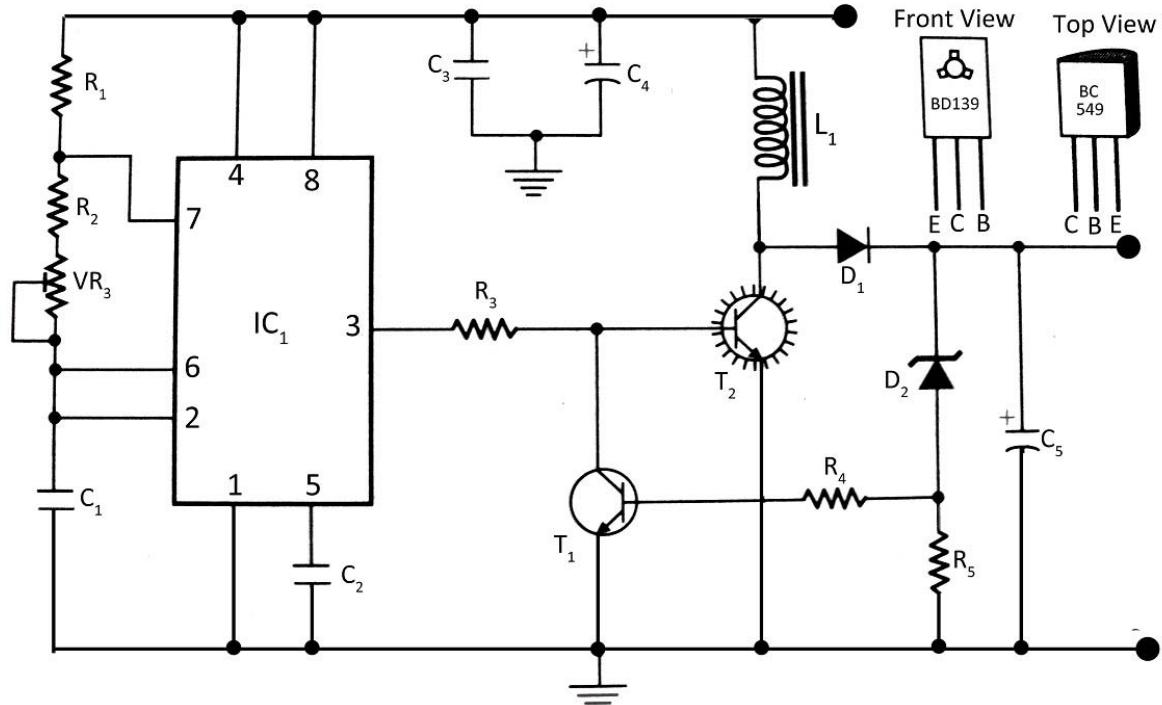
Another circuit

Conversion of AC to AC is quite simple as compare to DC to DC converter because it only implies a transformer which converts AC from one voltage level to another voltage level. But conversion of DC to DC is quite tedious work without transformer and more power losses. Here is simple, low-cost, high precision circuit which converts 6-V DC to 12-V DC without using transformer and easy to construct with few component.

Circuit description of DC to DC conversion

The circuit of DC to DC conversion is build with a very popular IC LM555 used as multivibrator mood which generate required frequency range from 2 to 10 kHz to drive power transistor T2. Here potentiometer VR1 is used to adjust output frequency given to transistor T2 via resistor R3. A zener diode in this circuit is used as voltage regulator which regulates voltage to 12 volt.

Here Inductor L1 of 100 turns, 24 SWG enameled copper wire wounded on a 40mm dia. toroidal ferrite core and capacitor C5 is employed for energy storage. Transistor T1 is used to control output control with the help of resistor R4 R5.



PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1, R2, R5 = 10 K Ω ; R3, R4 = 220 Ω 1/2-watt; VR1 = 47 K Ω

Capacitors

C1 = 0.0047 μ F; C2 = 0.01 μ F; C3 = 0.1 μ F; C4 = 470 μ F/25V; C5 = 2200 μ F/35V

Semiconductors

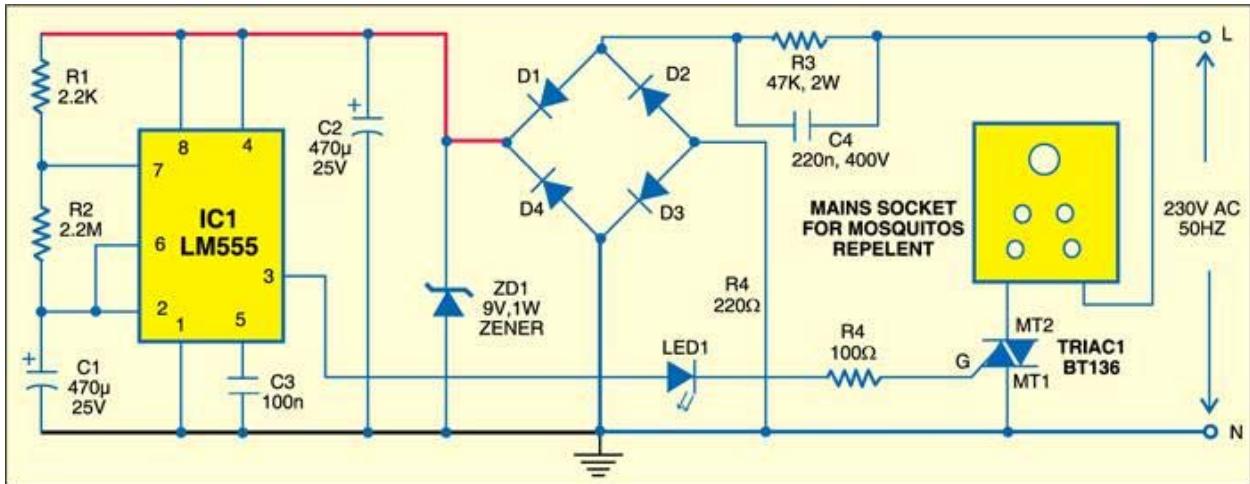
D1 = 1N4007; D2 = Zener 12V, 500mA $\frac{1}{2}$ -watt; T1 = BC549; T2 = BD139; IC1 = NE555 timer IC

Miscellaneous

L1 = 100 Turns, 24 SWG insulated copper wire on 40mm Dia. toroidal core

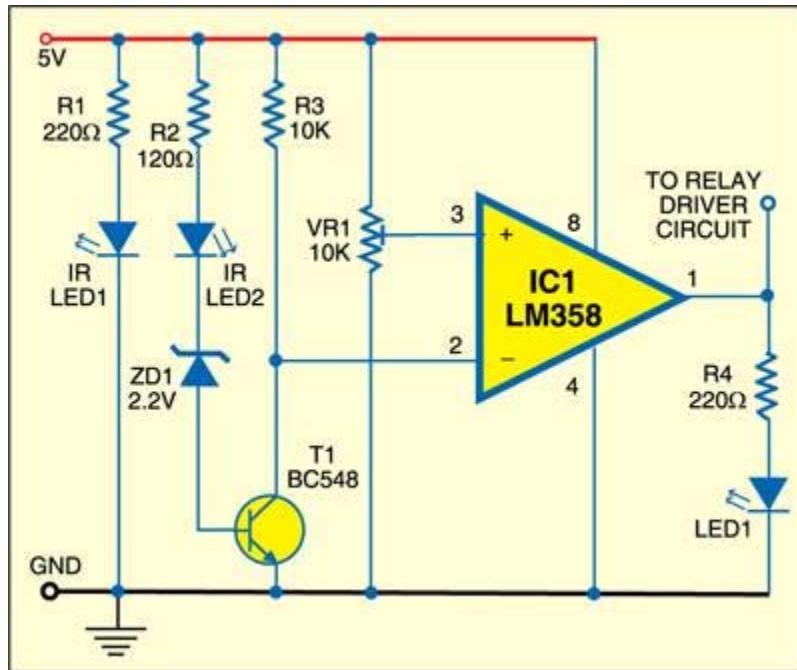
2. Periodically on-off Mosquito repellents circuit

Some of the mosquito repellents available in the market use a toxic liquid to generate poisonous vapours in order to repel mosquitoes out of the room. Due to the continuous release of poisonous vapours into the room, after midnight the natural balance of the air composition for good health reaches or exceeds the critical level. Mostly, these vapours attack the brain through lungs and exert an anesthetic effect on mosquitoes as well as other living beings by small or greater percentage. Long exposure to these toxic vapours may cause neurological or related problems [6].



3. IR sensors (infrared LEDs) to make an object-detection circuit

There are various applications of IR sensors such as TV remote controllers, burglar alarms and object counters. Here we have used IR sensors (infrared LEDs) to make an object-detection circuit and also a proximity sensor for path-tracking robots. The basic idea is to transmit the infrared light through an IR LED, which is then reflected by any obstacle ahead and sensed by the receiving LED.



Another circuit

infrared (IR) remote controller comprises the transmitter and receiver sections. The range of the transmitter can be increased up to 5 meter by using convex lens.

Circuit Description of infrared (IR) remote controller

Transmitter section: – The transmitter circuit of infrared (IR) remote controller is built around IC 741 (IC1) wired as frequency square wave oscillator. Gate pulse from pin no 6 of IC1 is given to gate of SCR1 to drive IR LED1. Variable resistor VR1 is used to vary the generated frequencies.

Receiver Section: – The receiver circuit of infrared (IR) remote controller consist an IC 741, photo transistor (T1) and medium power transistor (T2).

Photo transistor receives the transmitted signal and given to pin 2 of IC2 for amplification. The amplified output from pin 6 of IC2 is given to base of relay driver transistor (T2) through non-polarized capacitor C5, diode D1 and resistor R8. Variable resistor VR1 is used to match the transmitting and receiving signal.

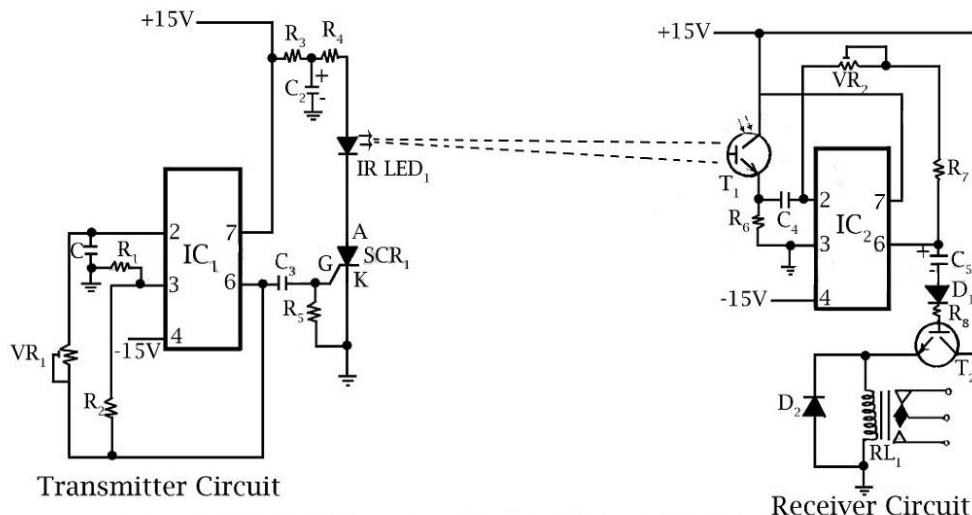


Figure 1: Circuit Diagram of Infrared Remote control

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1, R2 = 100 K Ω ; R3, R5, R8 = 1 K Ω ; R4 = 15 Ω ; R6 = 22 K Ω ; R7 = 10 M Ω ; VR1 = 1 M Ω ; VR2 = 2.2 M Ω

Capacitors

C1, C3, C4 = 0.1 μ F; C2 = 1 μ F/100V; C5 = 2.2 μ F/16V

Semiconductors

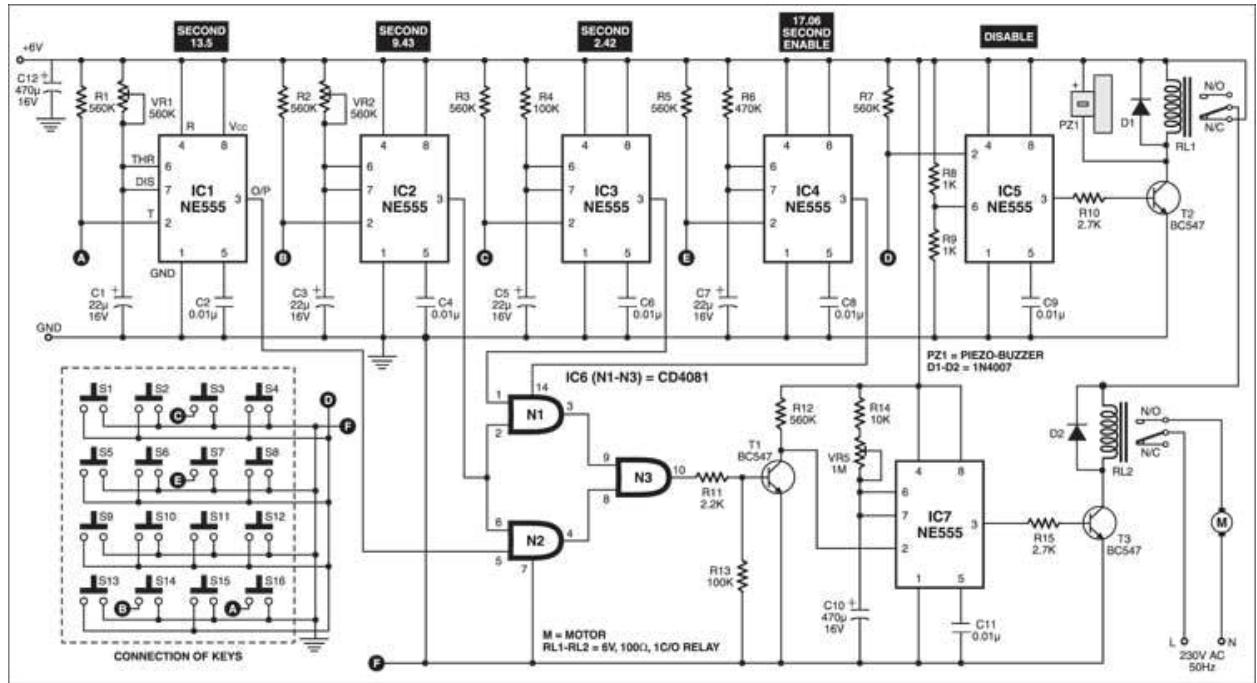
IC1, IC2 = 741; SCR1 = SN050; T1 = photo transistor; T2 = SL100; D1, D2 = 1N4001

Miscellaneous

RL1 = 15V, 500 Ω Relay; IR LED

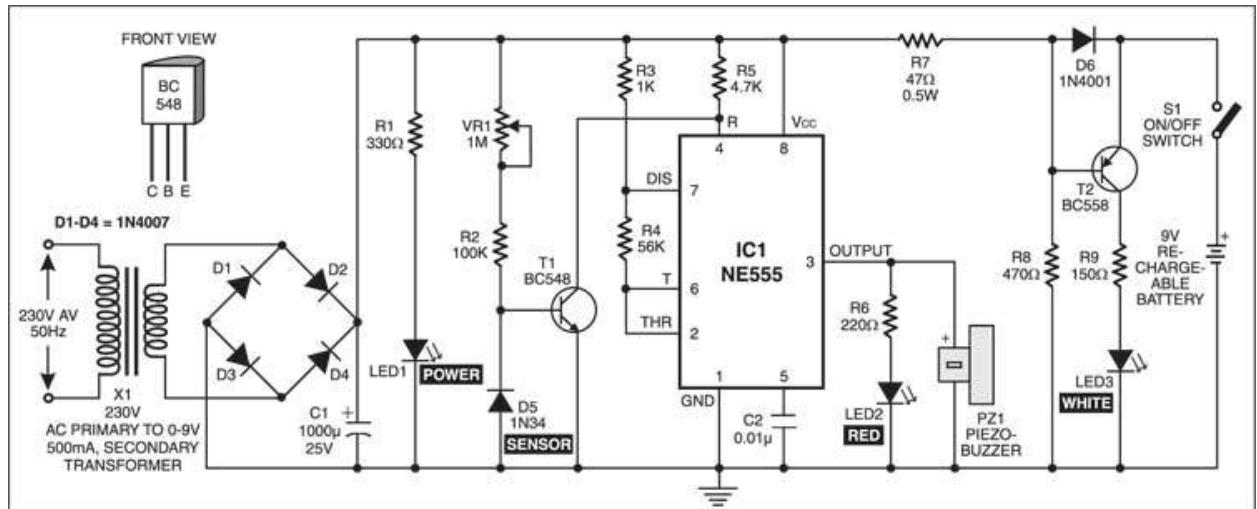
4. Simple Key-Operated Gate Locking System

This simple key-operated gate locking system allows only those persons who know the preset code to open the gate. The code is to be entered from the keypad within the preset time to operate the motor fitted in the gate. If anyone trying to open the gate presses a wrong key in the keypad, the system is disabled and, at the same time, sounds an alarm to alert you of an unauthorised entry. [1]



5. Mains Box Heat Monitor

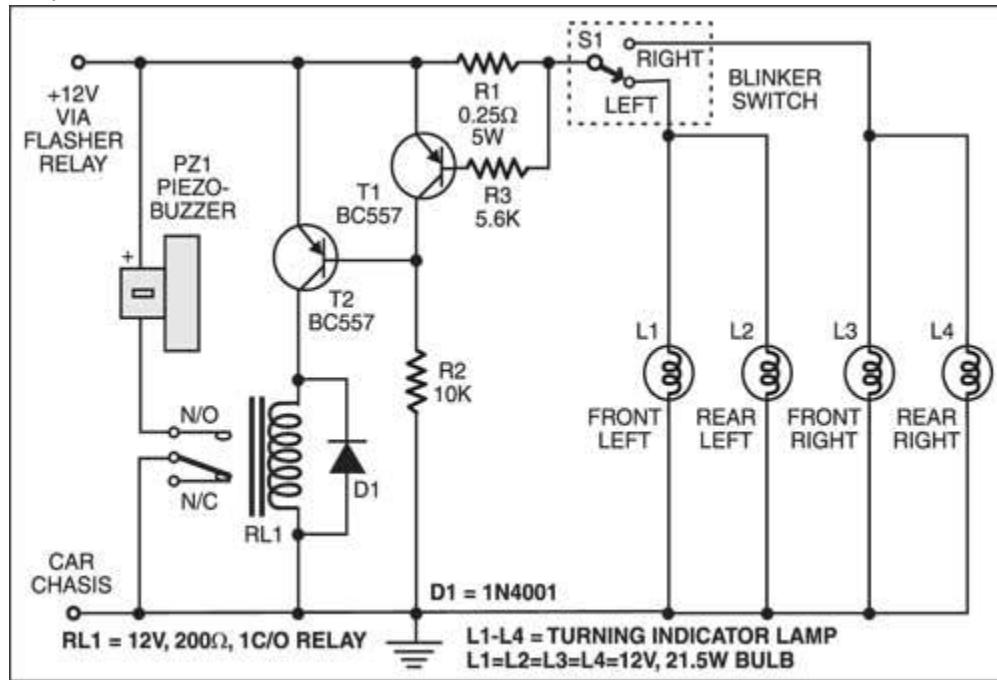
This simple circuit monitors the mains distribution box constantly and sounds an alarm when it senses a high temperature due to overheating, helping to prevent disasters caused by any sparking in the mains box due to short circuits. It also automatically switches on a bright white LED when the power fails. The LED gives ample light to check the mains box wiring or fuses in darkness. The circuit beeps once when power fails and again when power resumes [2].



6. Faulty Car Indicator Alarm

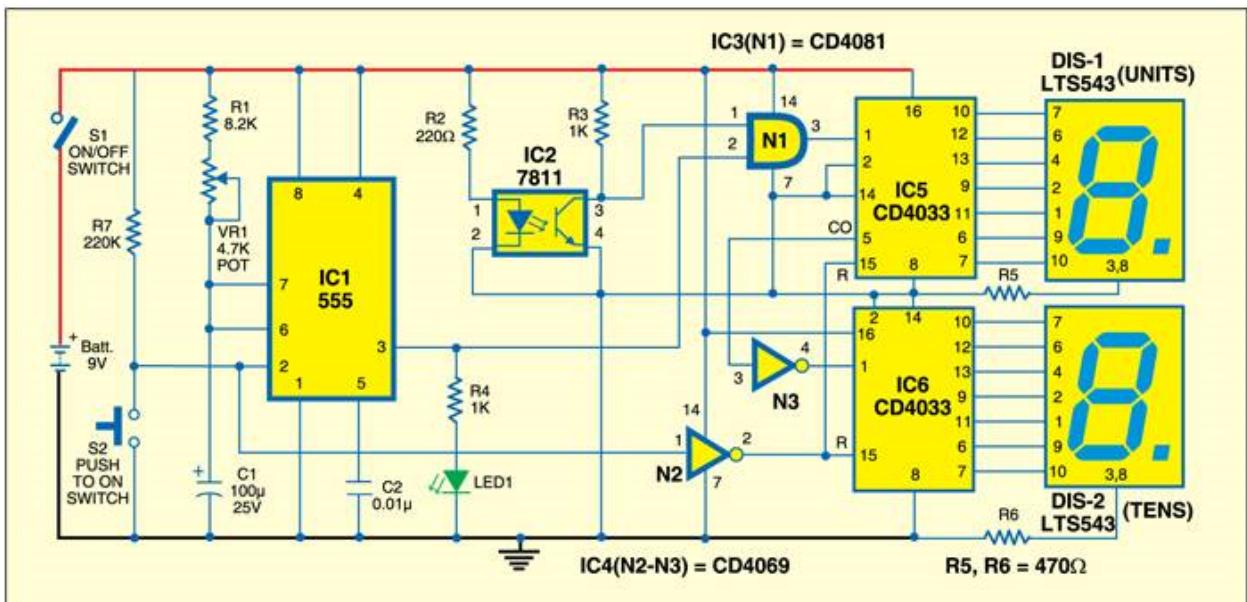
Before taking a turn, either left or right, car drivers need to switch on the car turn indicator lamps so that the approaching vehicle drivers can take precaution accordingly. An accident is likely to occur in case your car turn indicator lamps fail to glow due to some reason or the other. Here is a

circuit that sounds an alarm if your turn indicator lamps don't glow, helping you to safeguard against any accident.[3]



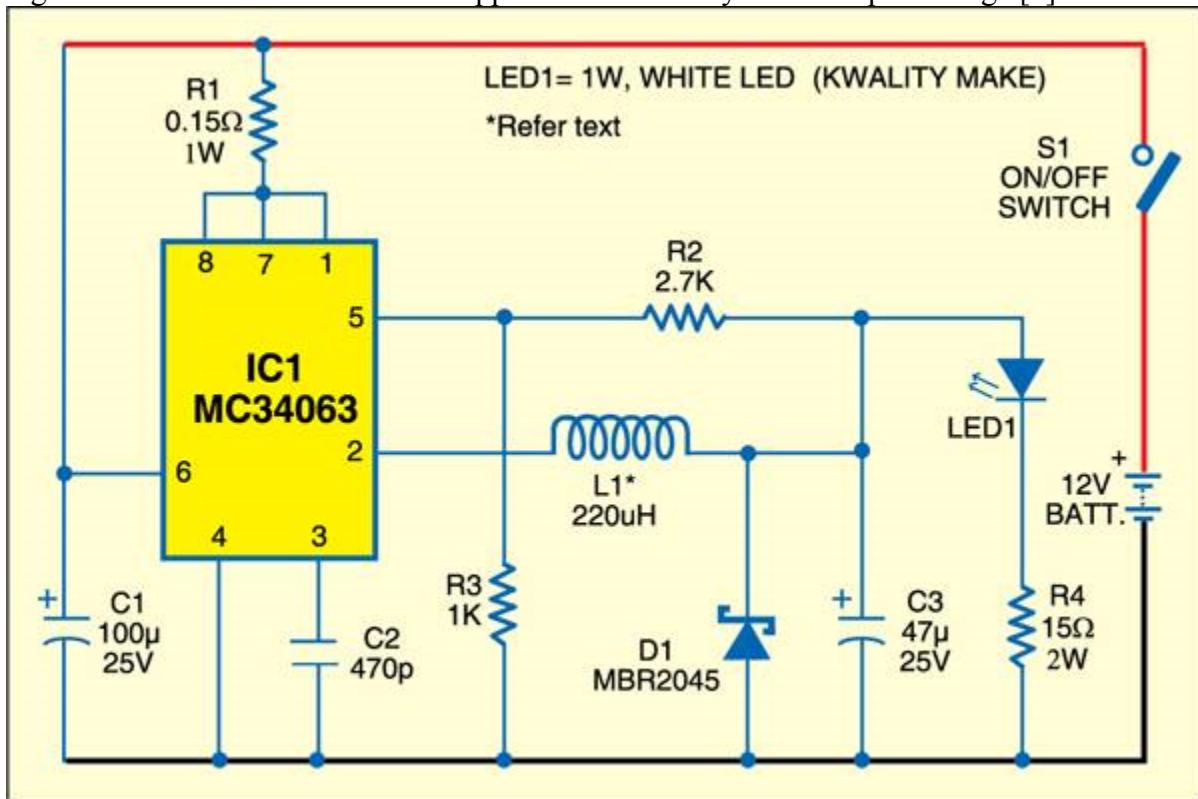
7. TACHOMETER

A tachometer is an instrument that measures the rotational speed of a shaft or disk in a motor or other machine. Here we present the basic version of the tachometer that shows the revolutions per second (RPS) on a digital display.[4]



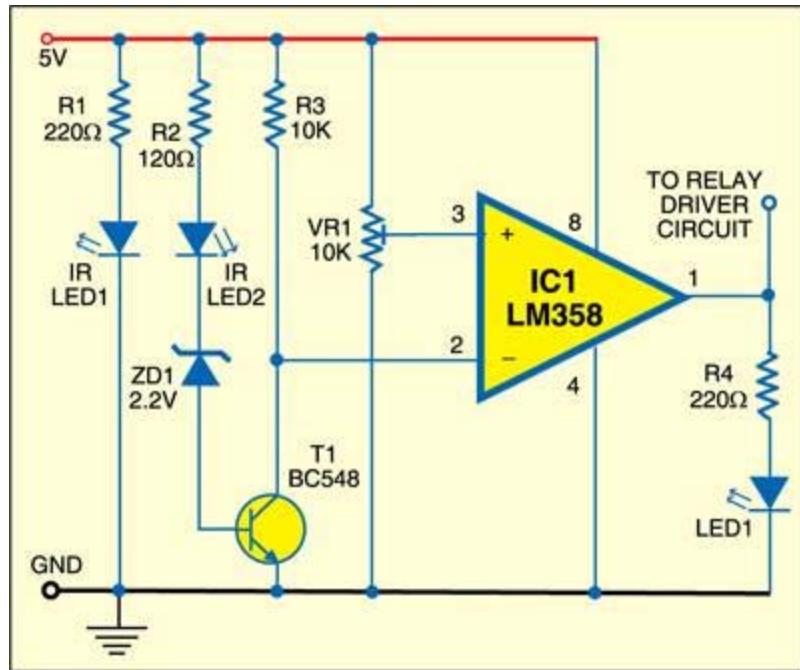
8. 1W LED For Automotive Applications

This simple circuit lets you run a 1W LED from the battery of your car. IC MC34063 is used here as a buck converter. It is a monolithic switching regulator sub-system intended for use as a DC-DC converter. The device consists of an internal temperature-compensated reference, a comparator, a controlled duty-cycle oscillator with an active current-limit circuit, a driver and a high-current output switch. These functions are contained in an 8-pin dual in-line package. Another major advantage of the switching regulator is that it allows increased application flexibility of the output voltage [5].



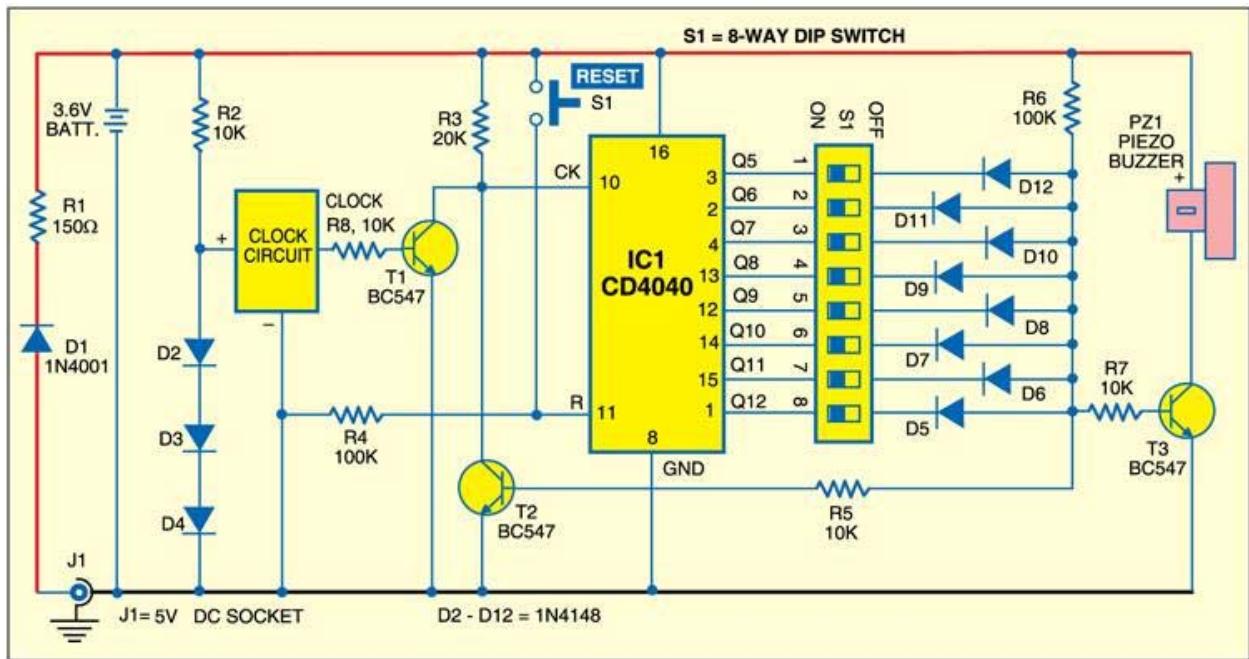
9. Play With Robotic Eye (IR Sensor)

There are various applications of IR sensors such as TV remote controllers, burglar alarms and object counters. Here we have used IR sensors (infrared LEDs) to make an object-detection circuit and also a proximity sensor for path-tracking robots. The basic idea is to transmit the infrared light through an IR LED, which is then reflected by any obstacle ahead and sensed by the receiving LED [7].



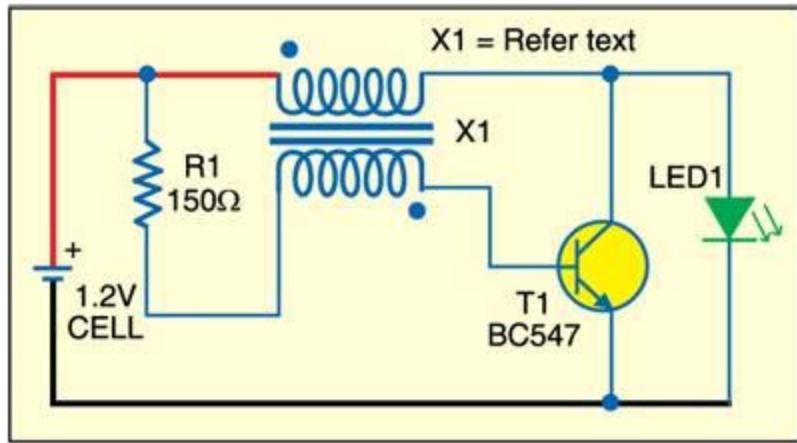
10. Timer From Old Quartz Clock

You can build an accurate, low-cost timer from the circuit of an old quartz clock. This timer has a time duration of up to two hours, which is sufficient for most day-to-day activities [8].



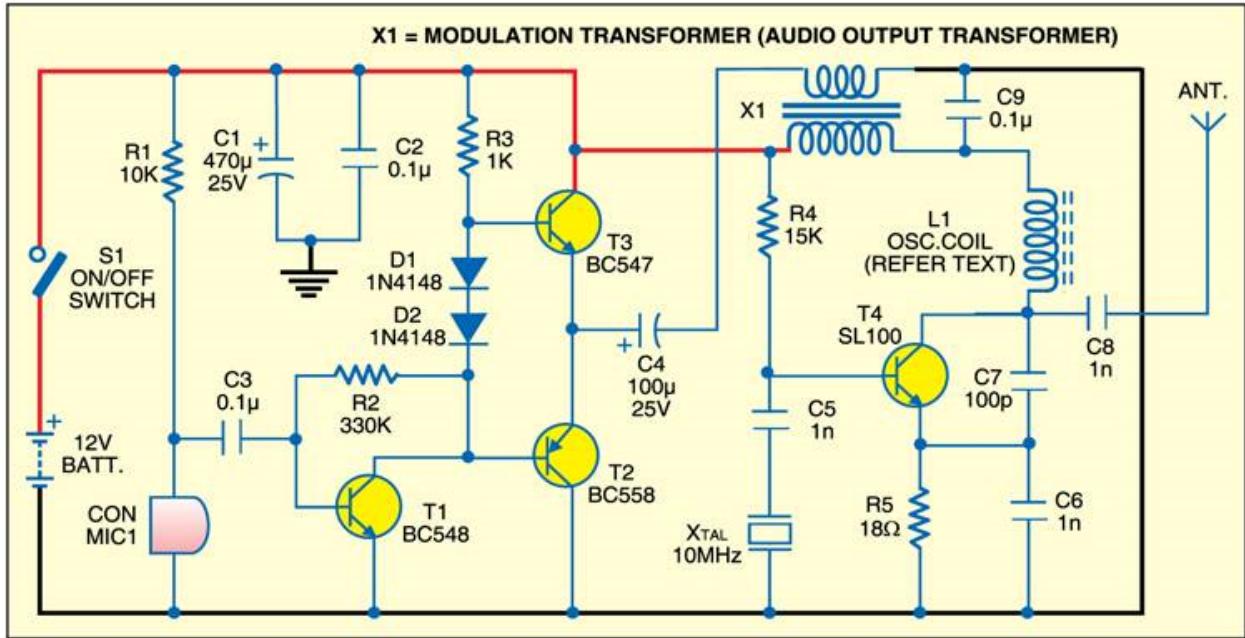
11. Keep Away Ni-Cd From Memory Effect

Ni-Cd batteries suffer from an undesirable memory effect due to partial discharge. The remedy is to completely discharge the battery before recharging [9].



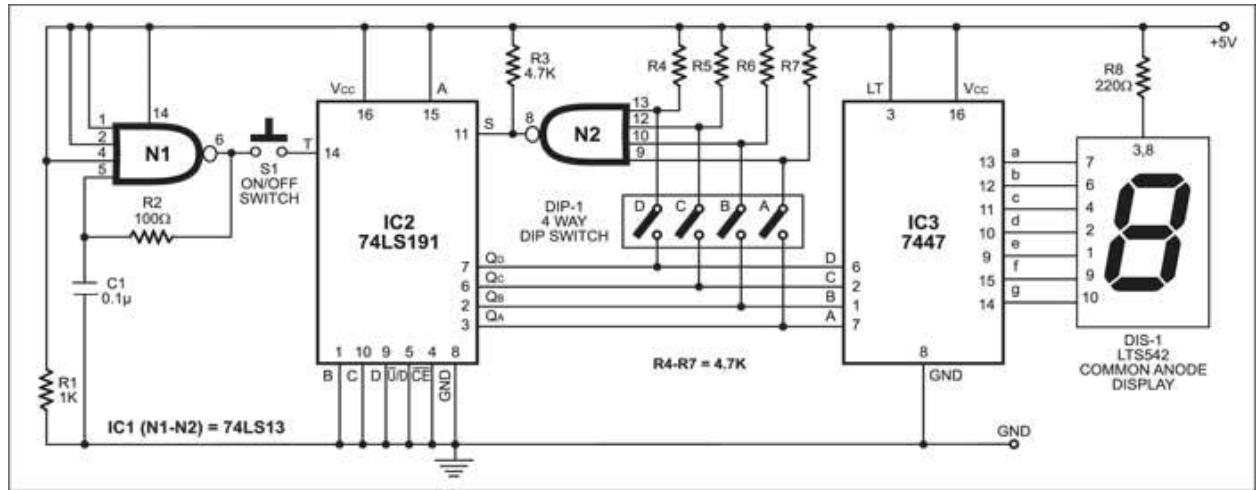
12. Crystal AM Transmitter

Here is the circuit of a medium-power AM transmitter that delivers 100-150 mW of radio frequency (RF) power [10].



13. Programmable Electronic Dice

Here's a simple programmable electronic dice with numeric display. This dice can be programmed using a 4-way DIP switch to display any random number between '1' and '2,' '1' and '3,' ... or '1' and '9' [11].



14. Software of the Month: Resistor Calculator 1.0.6

A simple, easy-to-use freeware for Windows that saves a lot of time and effort in determining the colour code of resistors and resistance values required for LED circuits [12].

Resistor Calculator 1.0.6

Presented here is a simple, easy-to-use freeware for Windows that saves a lot of time and effort in determining the colour code of resistors and resistance values required for LED circuits

DILIN ANAND

Every resistor is marked with colour bands that indicate its resistance, tolerance and sometimes temperature coefficient as well. You might be familiar with the mnemonics for memorising the resistor colour coding: *B. B. ROY of Great Britain has a Very Good Wife*, where the capitalised letters stand for black, brown, red, orange, yellow, green, blue, violet, grey and white, respectively.

Quite often, the whole mental calculation process of resistor codes can be an exhausting task. It also consumes much time. Sometimes you may not remember the mnemonics.

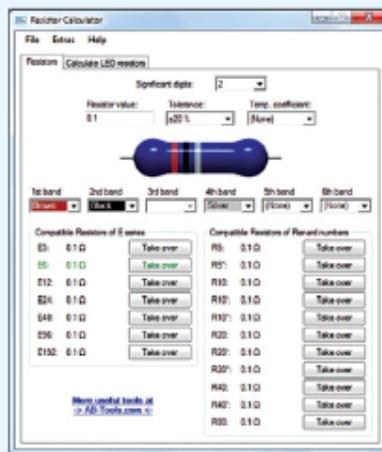


Fig 1: Home screen of resistor calculator

interface is clear and plain, which

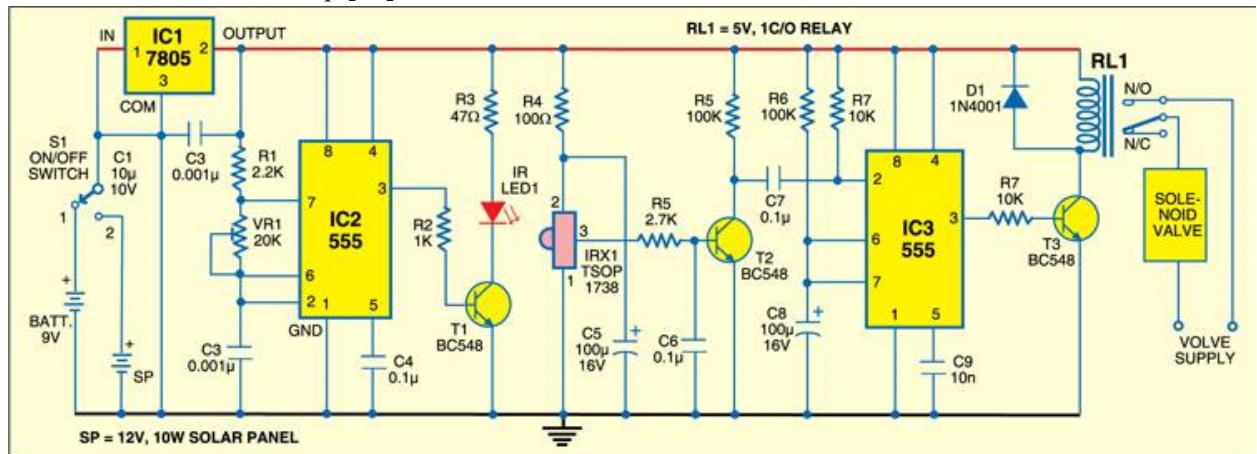
License type	Freeware
Developer	Andreas Breitschopp, AB-Tools.com
Operating system	Windows 8, Windows 7, Windows Vista and Windows XP
Latest version	1.0.6
File size	1.29 MB

is a freeware. The users get the latest updates of this program automatically. All updates are absolutely free.

The integrated help system is simple and easy to understand. It also has an intuitive program interface. Further help and support is provided by e-mail and is also available at their website. The program is currently

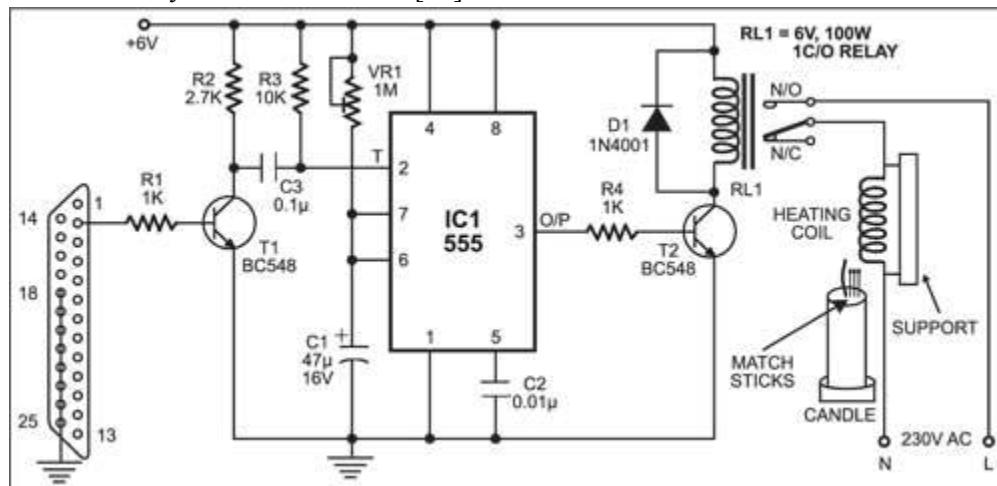
15. IR-Controlled Water Supply

This circuit can be used in homes or small restaurants for any type of water supply unit, such as toilet flush or washbasin tap [13].



16. PC-Based Candle Igniter

Here's a PC-based lighting system that lets you light up a candle using matchsticks by just pressing the 'Enter' key on the PC's keyboard. It is especially useful when celebrating such occasions as birthdays and anniversaries [14].



17. Noise Meter

Noise pollution tends to many non-communicable diseases and. Safe level of noise is considered up to 30 dB. Here is a interesting circuit by dreamlover technology, "Noise Meter" used to measure the level of noise indicating by LED and in addition it give warning when noise crosses the safe level of 30 dB by beeping sound.

Circuit description of Noise meter

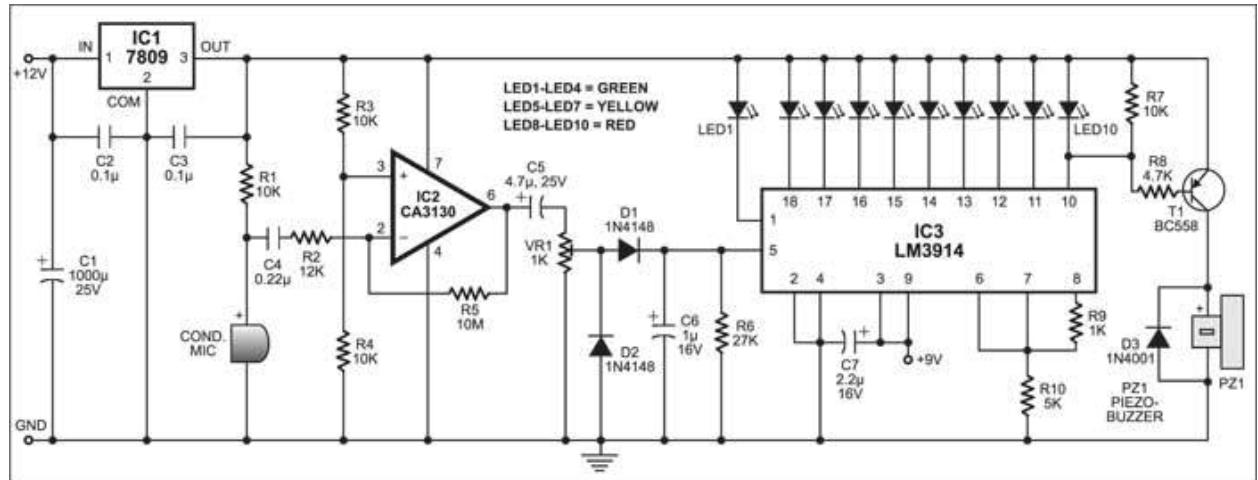
The entire circuit of noise meter has been designed and fabricated using sound intensity sensor and display unit. Here condenser microphone is used as sensor of noise meter with operational amplifier (IC2) and corresponding passive components. The inverting and non-inverting input is given to operational amplifier IC (IC2) from pin 2 and pin 3 respectively. Where output from pin 6 of IC2 is connected to the inverting input for negative feedback through resistor R5. The

controlling sound ac signal from potentiometer VR1 is first rectified by diode (D1 and D2) and maintains it at the output level of IC2.

The display unit is designed around monolithic IC LM3914 (IC3). It drives ten LEDs by sensing analog voltage. Each LED is connected to output of IC3 represents the sound level of 3 dB in descending order from 18 to 10. The glowing all ten LEDs indicate sound intensity is 30dB.

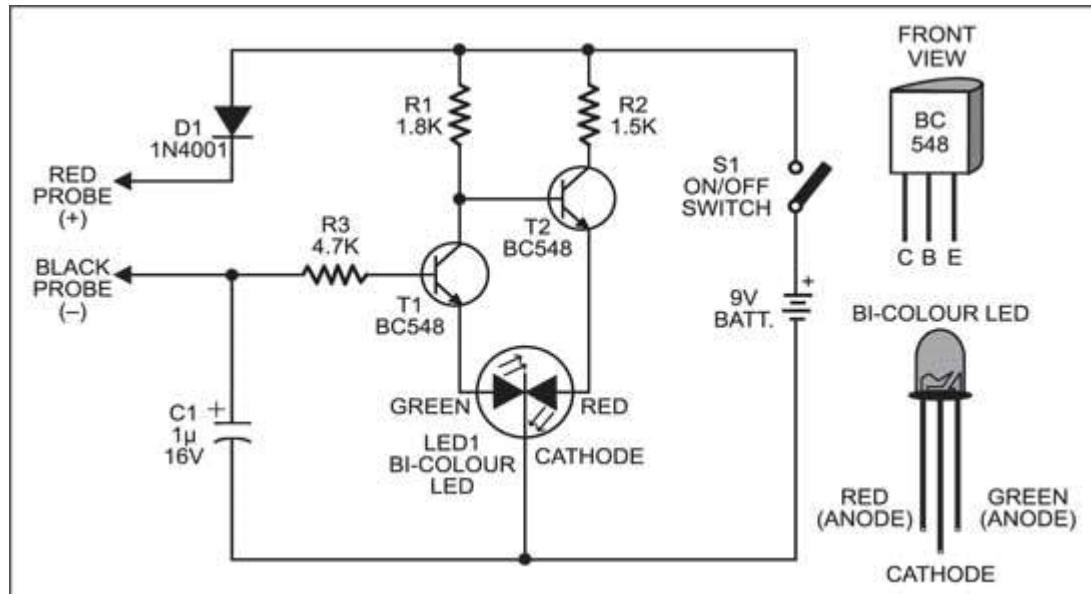
The PNP transistor get base bias when output at pin 10 of IC3 goes low to drive the piezo buzzer in order to give sound.

Normally, sound intensity up to 30 dB is pleasant. Above 80 dB, it becomes annoying. And if it goes beyond 100 dB, it may affect your psychomotor performance, detracting your attention and causing stress. Noise pollution may also affect your hearing ability [15].



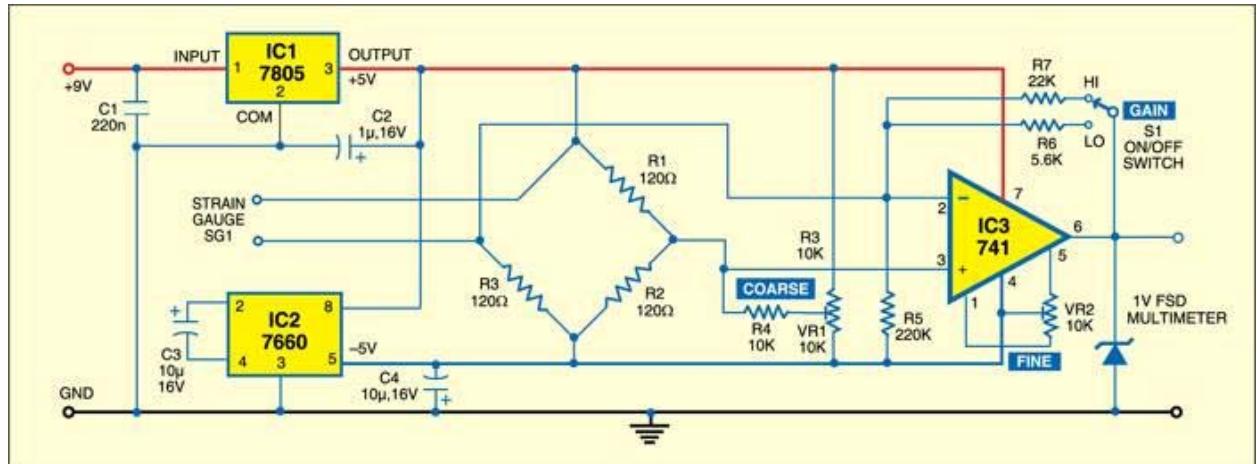
18. Handy Tester

For beginners, here's a low-cost multimeter that can be used to test the condition of almost all the electronic components from resistors to ICs. It uses only a few components but can also detect polarity, continuity, logic states and activity of multivibrators [16].



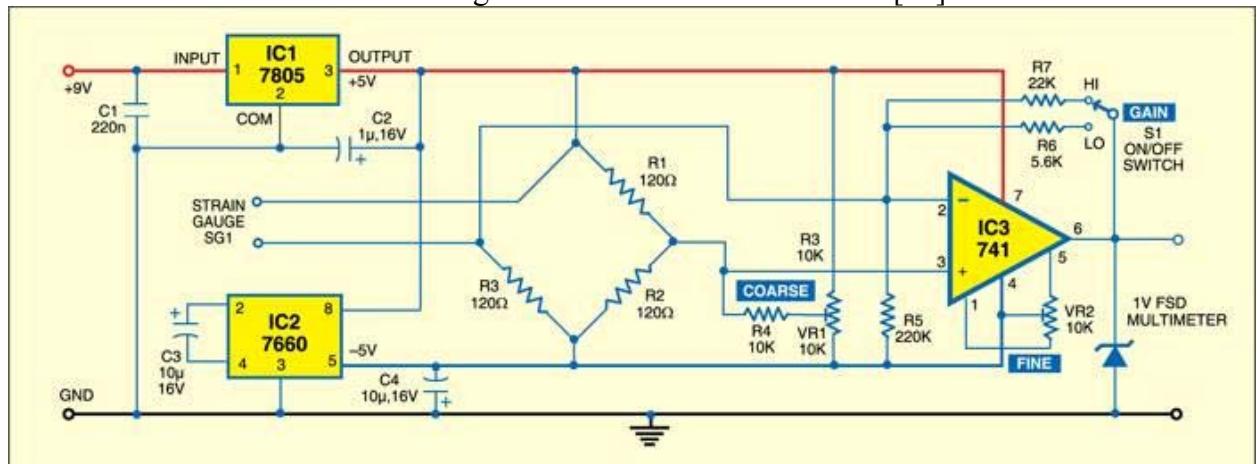
19. Linear Timer For General Use

This simple timer can be used to control any electrical appliance that needs to be switched off after certain time, like a small heater or a boiler, provided the relay-switch parameters meet the requirements of that appliance. It uses low-cost components and combines digital precision with simple analogue control, providing long timing durations without the use of high-valued resistors or capacitors [17].



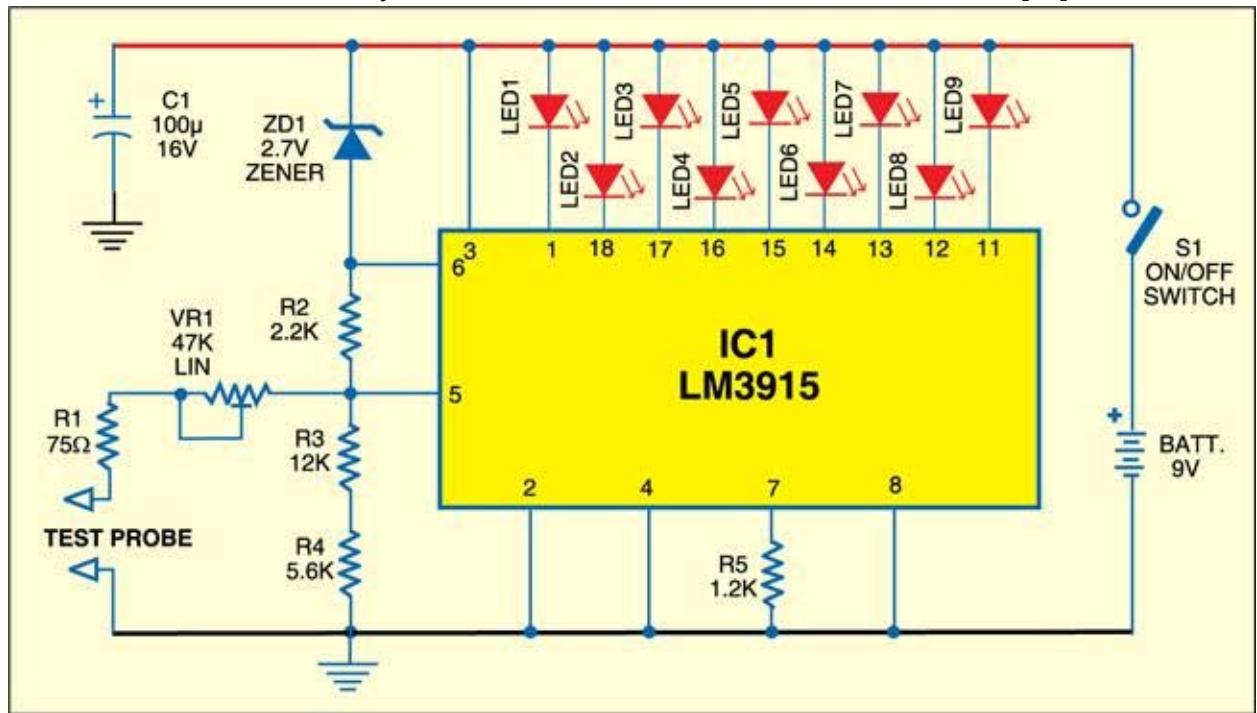
20. Strain Meter

This strain meter shows whether the strain is compressive (reducing the length) or tensile (increasing the length) when an object such as a strut on a crane changes its shape. The strain is sensed by a strain gauge that is glued to the object being tested. The change in resistance of the strain gauge produces a change in the reading of the meter. For the purpose, an analogue or digital meter, such as a voltmeter, can be used that has full-scale deflection of 1V DC. But use of a digital multimeter would be better [18].



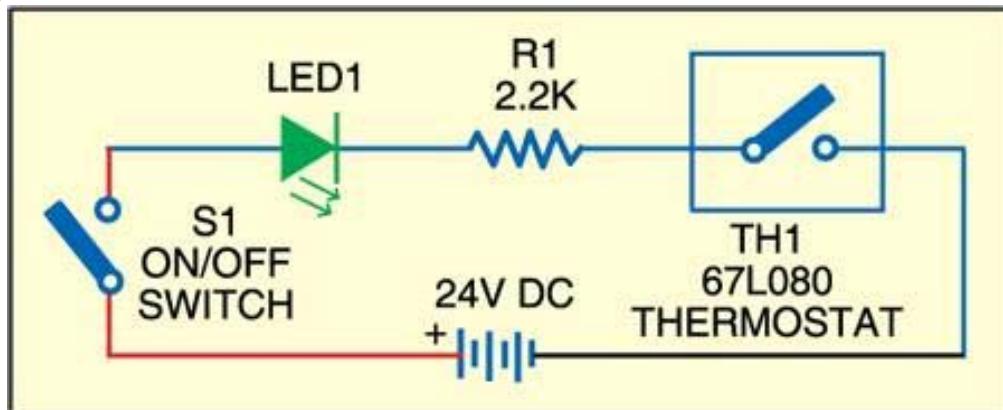
21. Digital Soil Moisture Tester

Here is a simple and compact digital soil moisture tester to check whether the soil is dry or wet. It can also be used to check the dryness or wetness of cotton, woolen and woven fabrics [19].



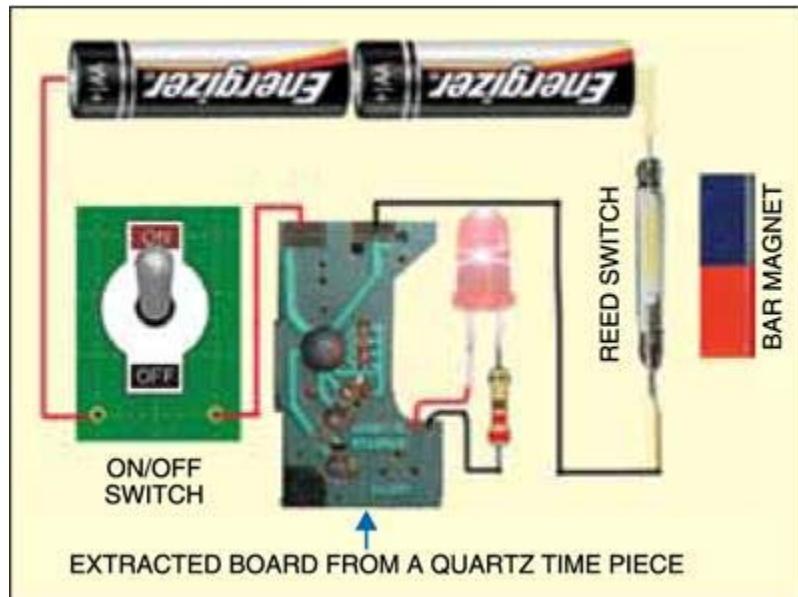
22. Over-Heating Indicator for Water Pipe

The hot water pipe from the water geyser of your bathroom may burst if it gets overheated and is left unattended. This circuit monitors the temperature of the water pipe. If the temperature of the pipe goes above certain limit, it flashes an LED [20].



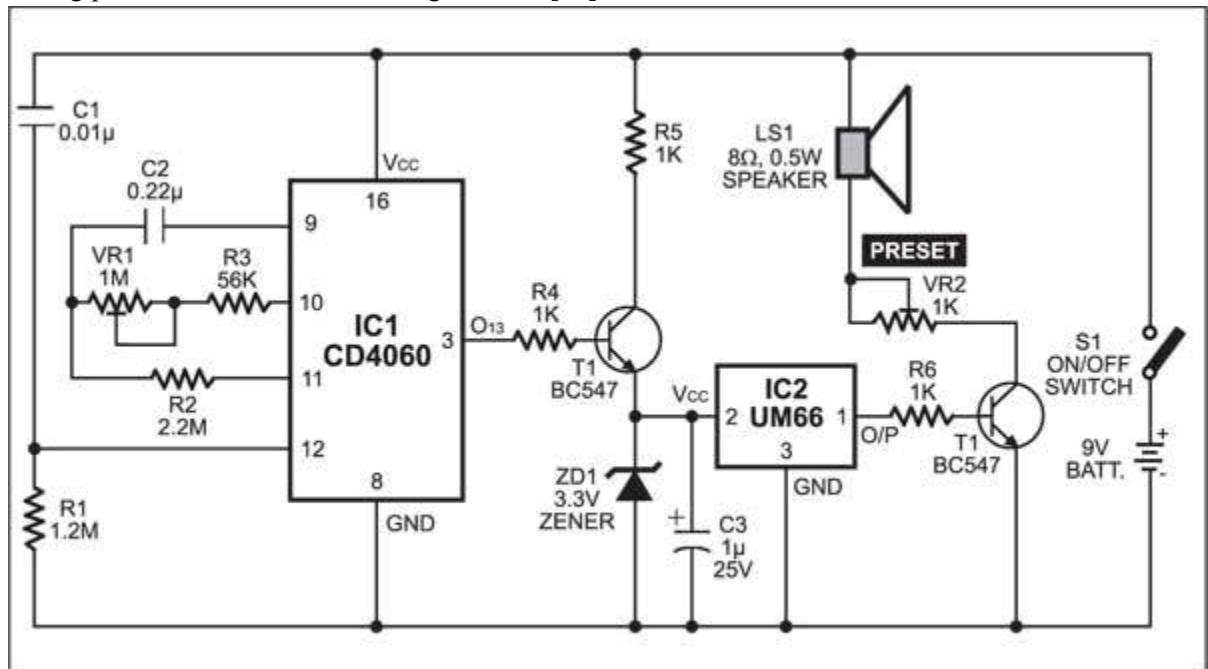
23. Simple Key-hole Lighting Device

This simple circuit is an extracted circuit board from a discarded quartz timepiece [21].



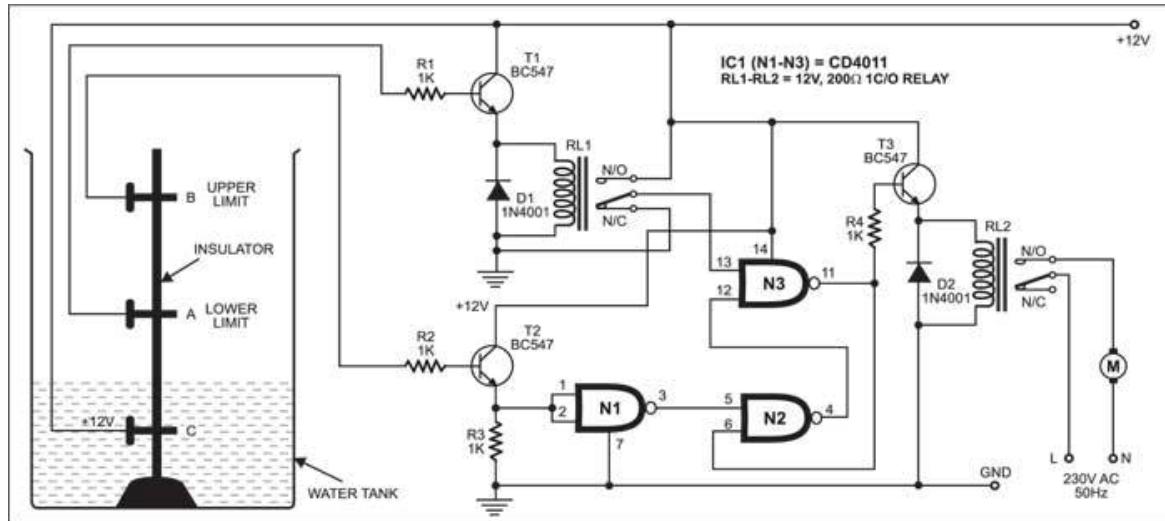
24. Timer with Musical Alarm

This low-cost timer can be used for introducing a delay of one minute to two hours. After the timing period is over, a musical song is heard [22].



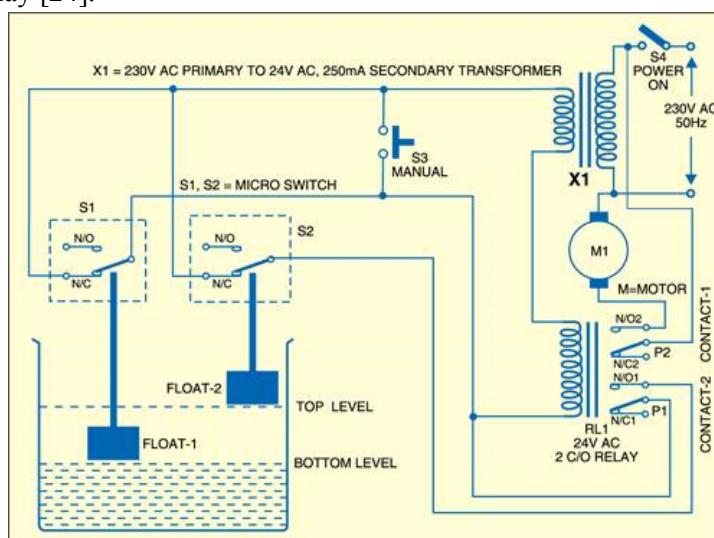
25. Automatic Water Pump Controller

Here's a circuit that automatically controls the water pump motor. The motor gets automatically switched on when water in the overhead tank (OHT) falls below the lower limit. Similarly, it gets switched off when the tank is filled up. Built around only one NAND gate IC (CD4011), the circuit is simple, compact and economical. It works off a 12V DC power supply and consumes very little power [23].



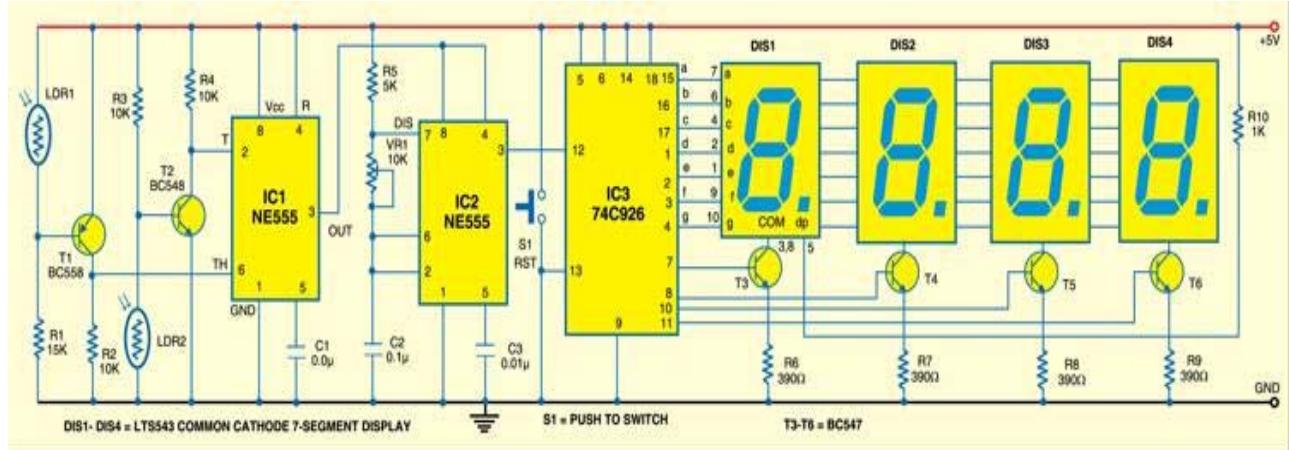
26. Water Pump Controller

Here is a simple circuit for controlling water level in an overhead tank. The main components of this pump controller are a step-down transformer, a 24V AC double-changeover relay, two floats and two micro switches. Any available relay can be used irrespective of its coil voltage. Of course, current rating of contacts should be taken into account according to the motor power. The relay should have two contacts. A step-down transformer having secondary voltage suited to the coil voltage of the relay is used. As the circuit works off AC, no rectification is necessary. Micro-switches S1 and S2 fixed on top of the water tank are operated by separate floats: one for sensing the bottom level and the other for top level. A three-core wire is used for connecting these switches to the relay [24].



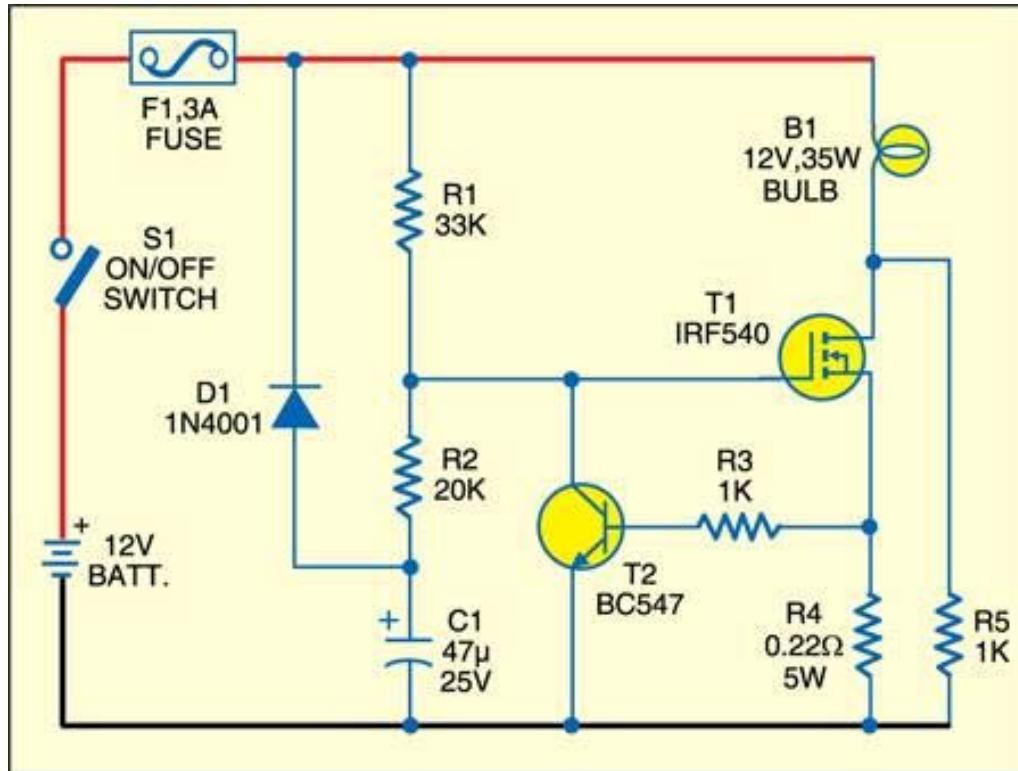
27. Ball Speed Checker

This circuit measures the speed of a cricket ball based on the time taken by the ball to travel the distance from the bowling crease to the batting crease [25].



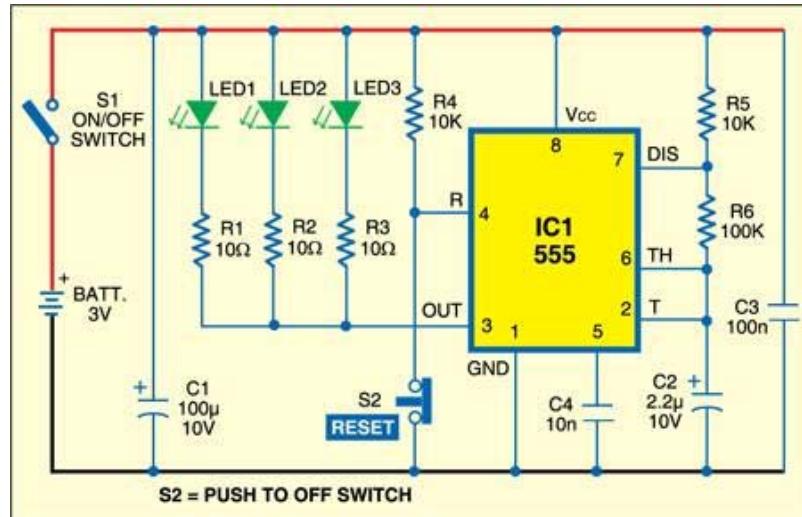
28. Halogen lamp Saver For Bikes

Halogen lamps are prone to burn-out owing to their low cold current. The rapid heating inside the lamp melts the thin filament and cuts the lamp life short. The circuit described here enhances the life of the halogen lamp by allowing soft turn-on of the lamp [26].



29. Night Vision Enhancer

Here is a simple green LED flashlight built around 555 timer IC (IC1) and powered from a 3V battery pack [27].



Another circuit

Load shedding is the common problem in developing country where student is more effected. By keeping this problem in mind the group of dreamlover technology post very simple, useful and inexpensive project using ultra-bright white LEDs which provide sufficient light for reading purpose which consume very low power i.e. 3 watts of power. It works like emergency light i.e. when AC mains failure, the battery backup circuit instantly light up the LEDs but when the power resumes, the battery supply is automatically disconnected and this circuit again works on AC mains.

Circuit Description of LED-based reading lamp

For power section the circuit of LED-based reading lamp use bridge rectifier connected to secondary coil of 0-7.5V, 500mA step-down transformer X1. Pulsating DC from output of rectifier is given to input of voltage regulator IC1 for pure DC output. All LEDs (LED1 to LED10) is connected in parallel across the output of voltage regulator. Here resistors R1 to R10 are connected in series with the LEDs respectively to limit the current. In this circuit 5 more LEDs can be used for lamp to increase intensity in the same manner used. When AC mains available relay RL1 energized and disconnect to battery and vice-versa on absent of AC mains. For charging battery, a lead from rectifier is directly connected to positive and negative terminals of battery. Here diode D5 and D6 is used as reverse-current protection diode that don't allow the battery current to flow towards the supply section and diode D7 is for reverse polarity protection.

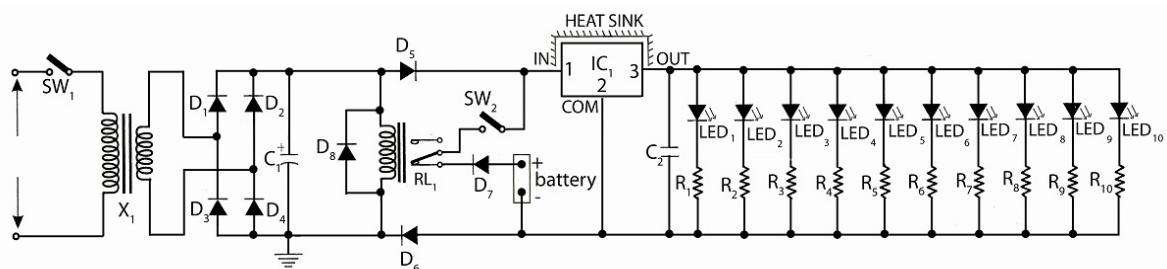


Figure 1: LED-based reading lamp

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1- R10 = $56\ \Omega$

Capacitors

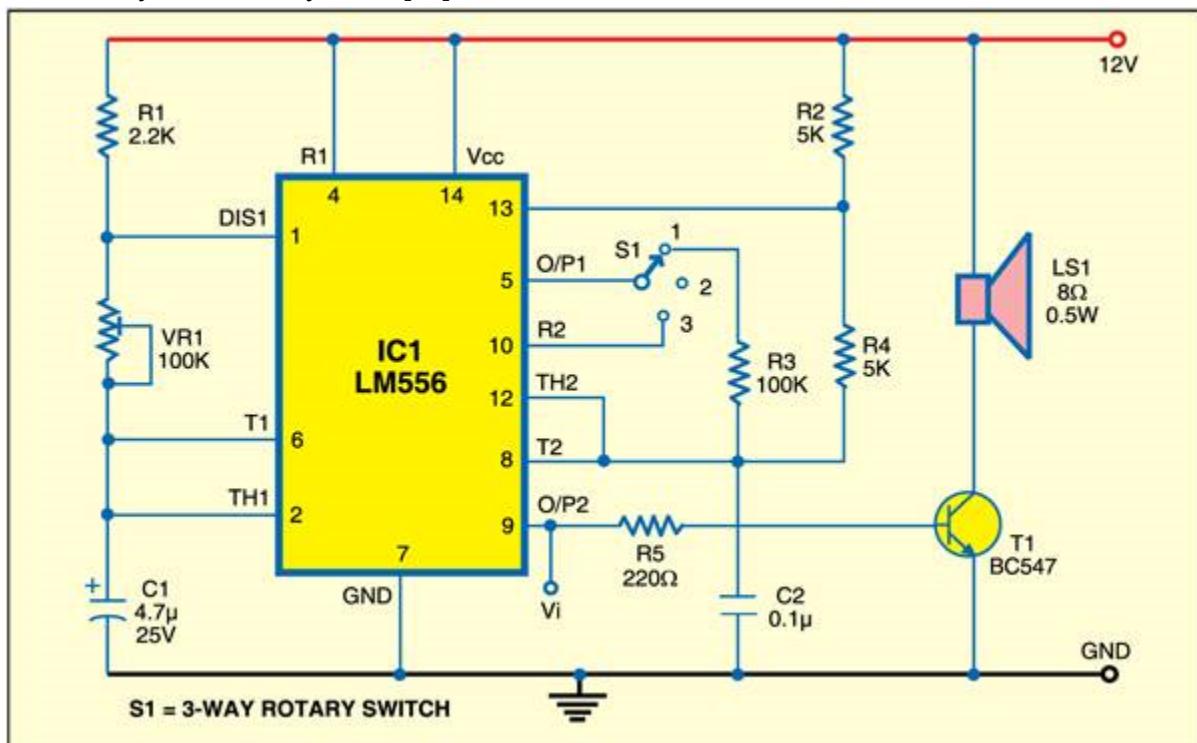
C1 = $1000\ \mu F/16V$; C2 = $0.1\ \mu F$

Semiconductors

IC1 = 7805 Voltage regulator

30. Triple-Mode Tone Generator

Here is a simple circuit that generates three different tones. You can use it as a call bell, burglar alarm or any other security alarm [28].



Another circuit.

Now, here is unique tone generator circuit which produces three different type of sound according to input three different logic levels (i.e. 0&1, 1&0 and 1&1).

Circuit description

This circuit is designed around digital IC 7400 which is NAND gate. The working of the circuit is like the working principle of oscillator circuit, where frequency depends upon capacitors C1 and C2. The duty cycle of this circuit is 50%. The output is given to power amplifier circuit which further drive loudspeaker or head phone. For low frequency value of capacitor C1 and C2 must be high and vice-versa.

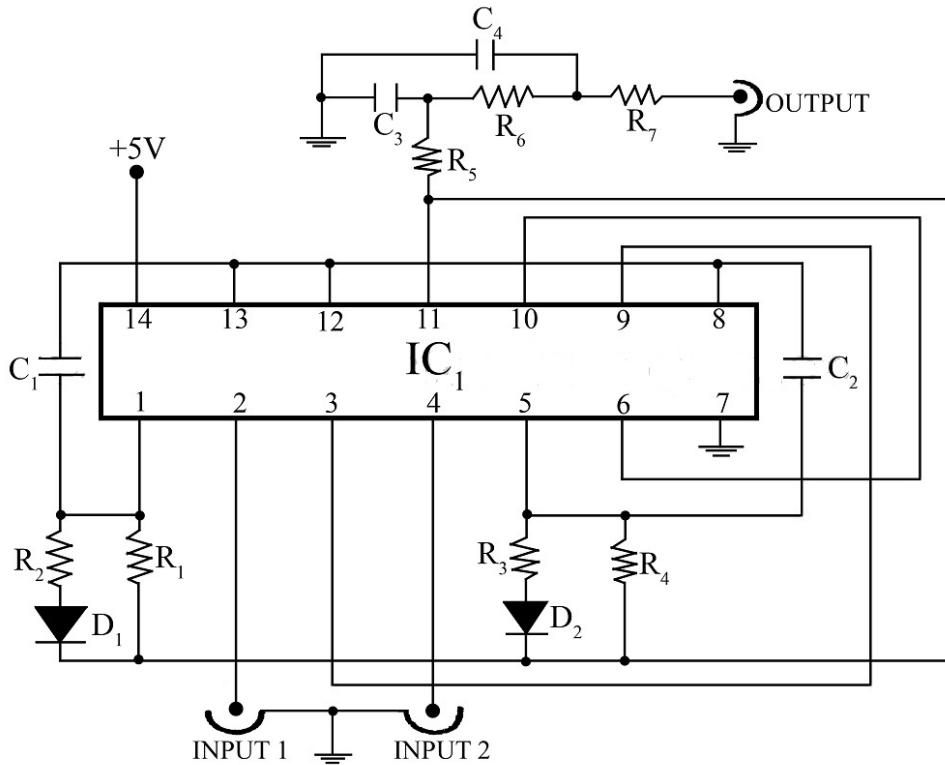


Figure 1: Circuit Diagram of Three in One Tone Generator

PARTS LIST

Resistors (all 1/4-watt, $\pm 5\%$ Carbon)

R1, R4 = 1.2 k Ω ; R2, R3 = 1 k Ω ; R5 = 10 k Ω ; R6, R7 = 47 k Ω

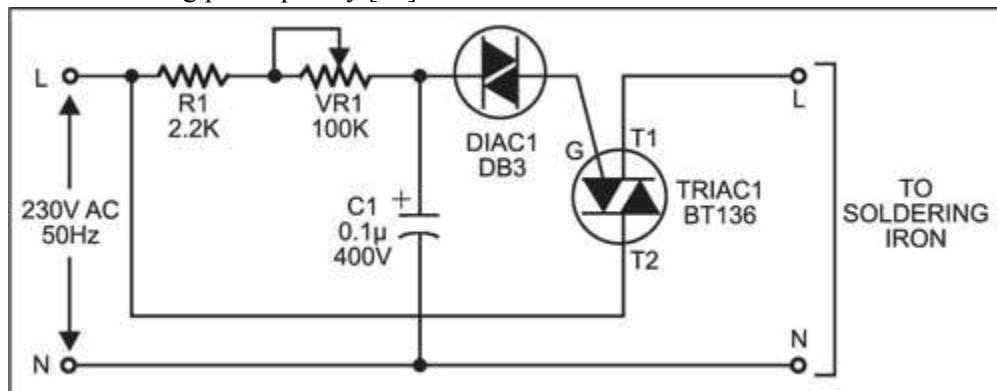
Capacitors

C1 = 100 pF; C2 = 220 pF; C3, C4 = 10 pF

Semiconductors IC1 = 7400 (NAND gate)

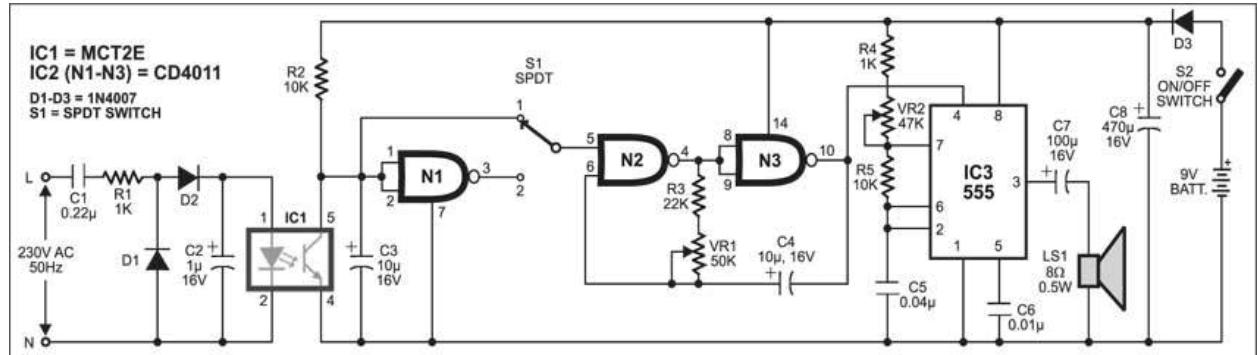
31. Soldering Iron Temperature Controller

Here is a simple circuit to control the temperature of a soldering iron. It is especially useful if the soldering iron is to be kept on for long since you can control the heat dissipation from the iron. When a soldering iron is switched on, the iron takes time to reach the solder's melting point. Simply connect this circuit to the soldering iron as shown in the figure and the iron reaches the solder's melting point quickly [29].



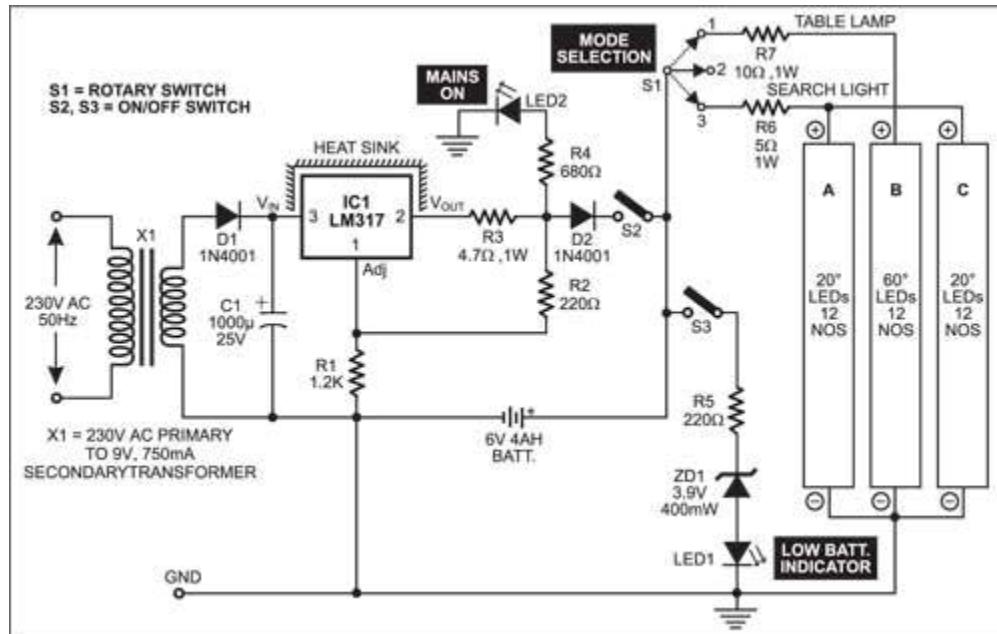
32. Mains Failure/Resumption Alarm

This mains indicator sounds an alarm whenever AC mains fails or resumes. It is very useful in industrial installations, cinema halls, hospitals, etc [30].



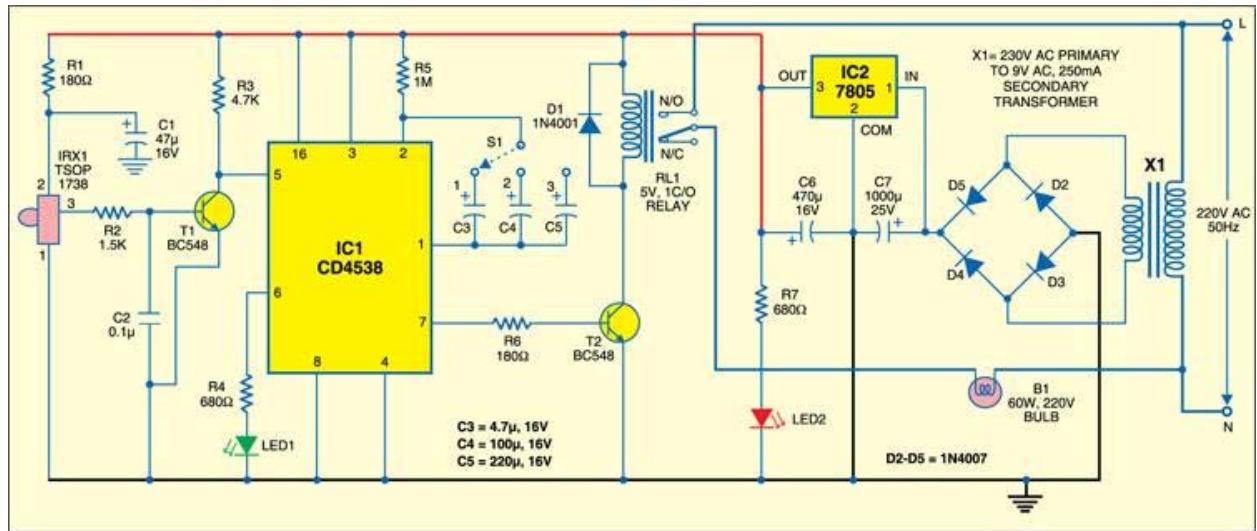
33. Multipurpose White-LED Light

Standard fluorescent lamps and their smaller versions called compact fluorescent lamps (CFLs) radiate light in all directions (360°) and tend to increase the room temperature. In emergency lights using these lamps, the battery lasts only a few hours due to the power loss during conversion of DC into AC. These limitations can be overcome by using ultra-bright white LEDs [33].



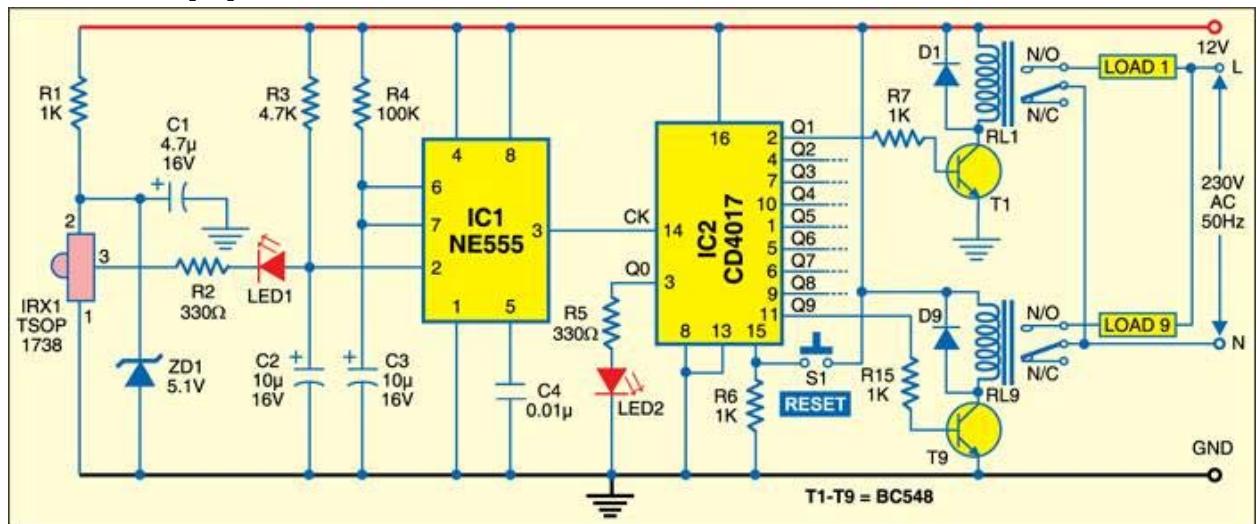
34. IR-Based light Control

This circuit turns on the lights at the portico, car parking or other areas when a motorbike or car enters through the gate to cross the sensing area. It can also be used as an electronic watchdog for your house, by activating an alarm simultaneously [33].



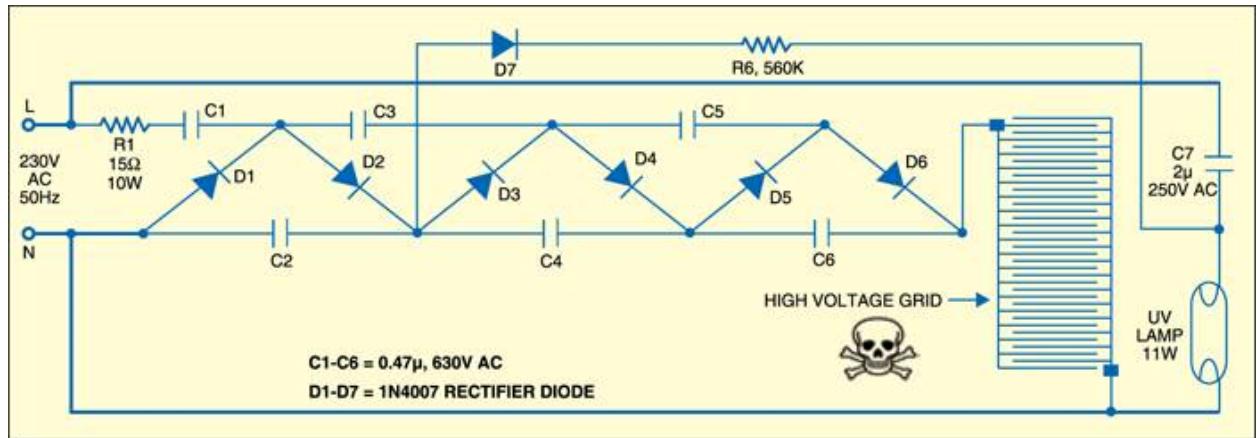
35. Sequential Device Control using TV Remote Control

This circuit lets you switch on and switch off up to nine devices sequentially from your TV remote control [33].



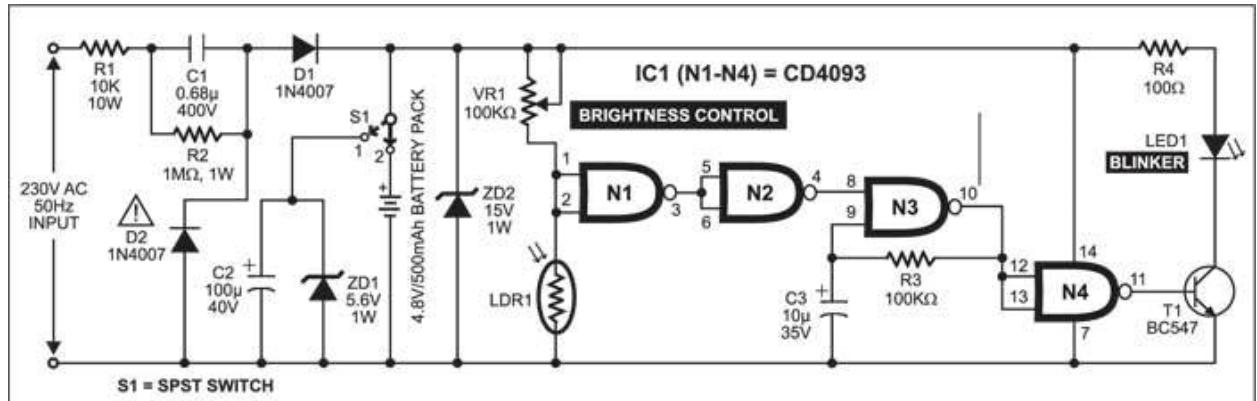
36. Make your own Electric Bug Zapper

None of us likes bugs at home. To kill these flying insects, they should first be attracted and then electrocuted. Bug zapper is one such device with a high-voltage electrocuting circuit and an insect-attracting UV lamp of 365 nm wave-length. This ultraviolet fluorescent lamp is mounted in the middle of the cabinet and a pair of carefully spaced, electrically insulated, charged wire grids surround the light. When an insect comes close enough to the mesh pair, an electrical arc is formed, the dielectric breaks down and current flows through the insect's body. Electrocuted the insect doesn't require it to touch both the wires as an arc forms in the air gap over 1800V [34].



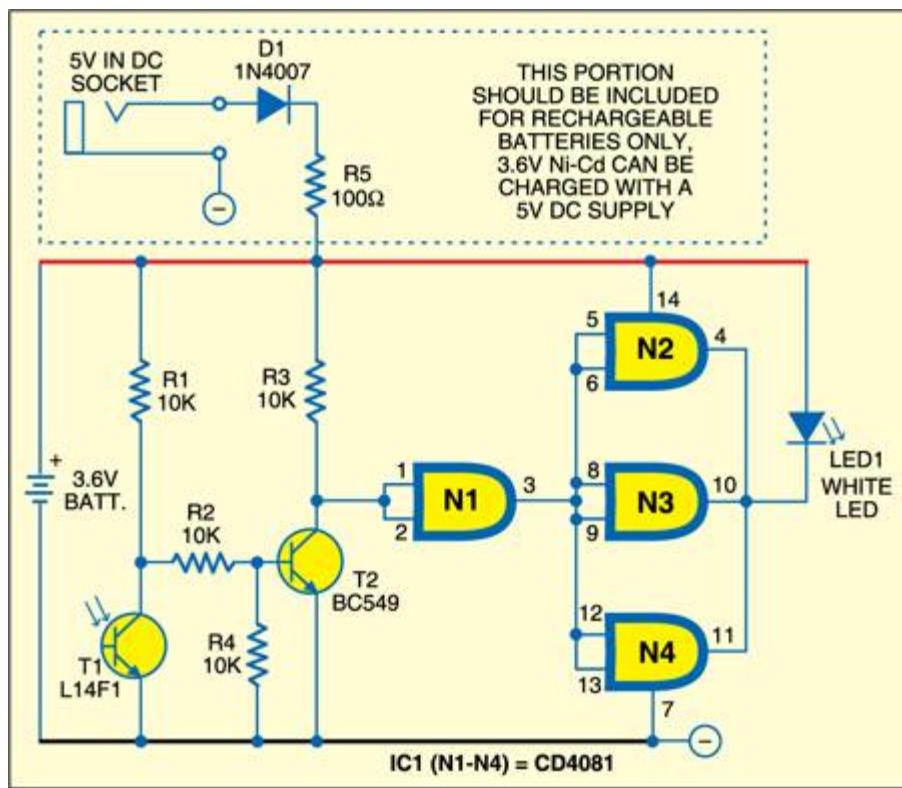
37. Twilight Lamp Blinker

During sunset or sunrise, the ambient light is not adequate to lead you through the open doorway or make your way around obstructions. To avoid any mishap, here is a twilight lamp blinder that you can place near obstructions [35].



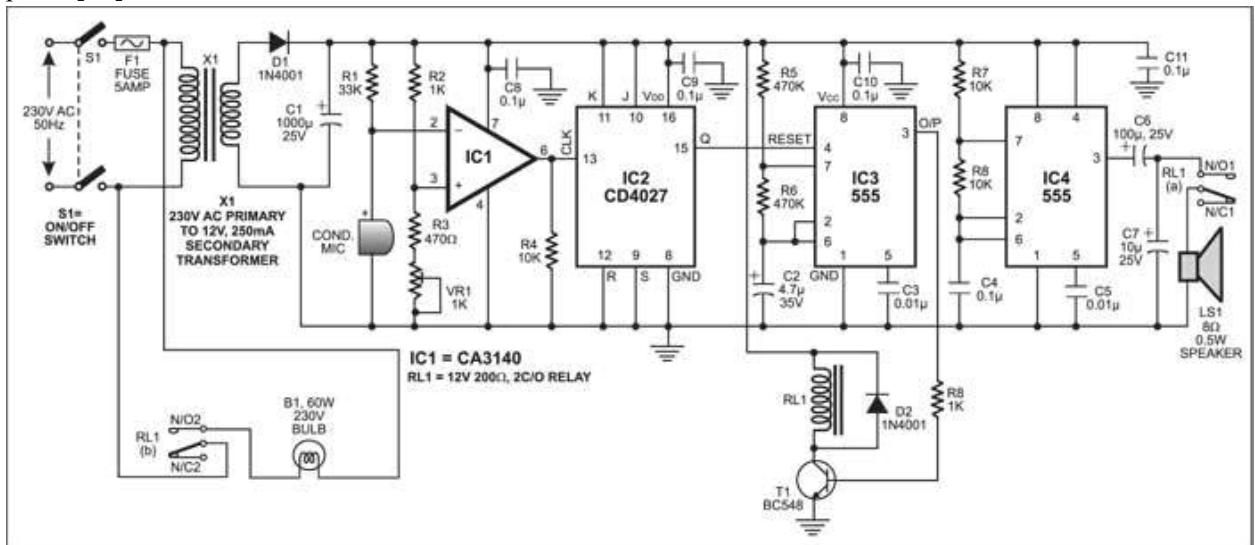
38. Emergency Photo Lamp

This emergency light can be powered either by a rechargeable battery (like 3.6V Ni-Cd) or a non-rechargeable battery (3.0V CR2032). The white LED (LED1) glows automatically when the power fails and you are left in dark. The quiescent current of the circuit is very low and the battery is practically used only when the LED glows [36].



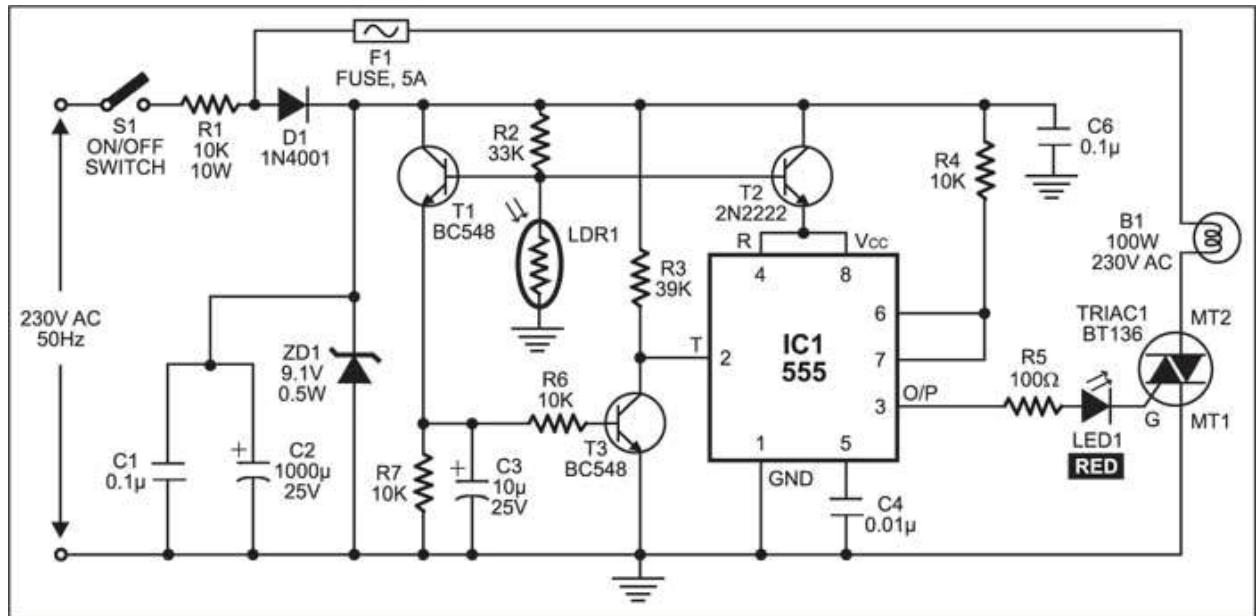
39. Sound-Operated Intruder Alarm

When this burglar alarm detects any sound, such as that created by opening of a door or inserting a key into the lock, it starts flashing a light as well as sounding an intermittent audio alarm to alert you of an intruder. Both the light and the alarm are automatically turned off by the next sound pulse [37].



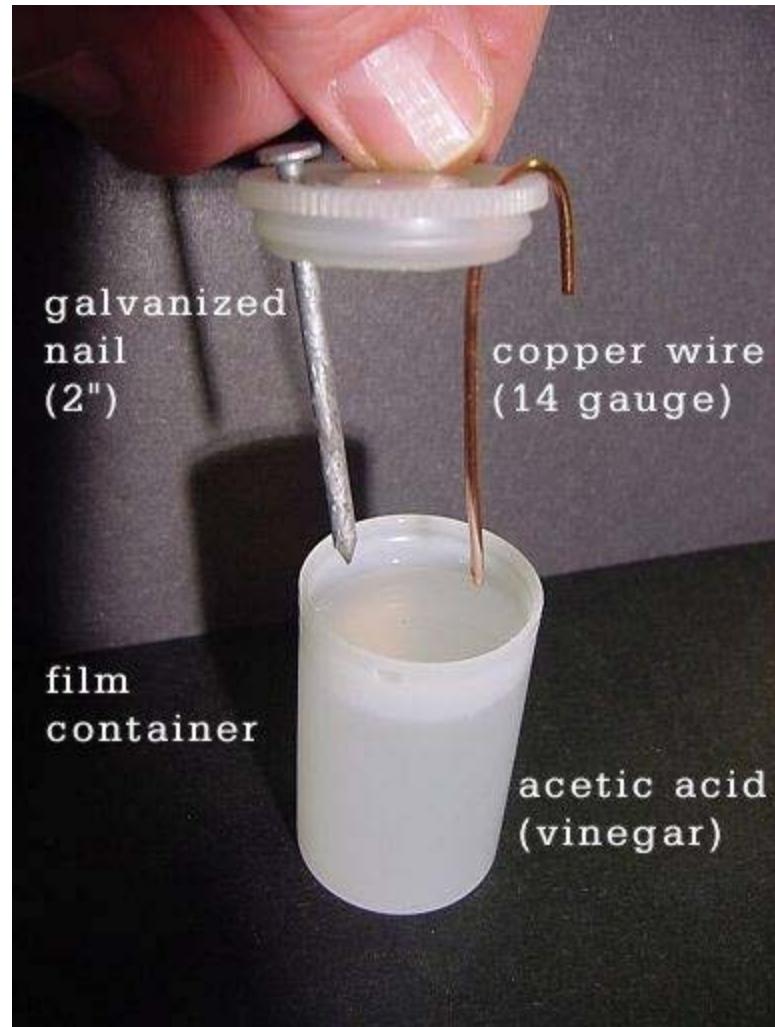
40. Electronic Street Light Switch

Here's a simple and low-cost street light switch. This switch automatically turns on the light at sunset and turns it off at sunrise. The automatic function saves electricity besides man-power [38].



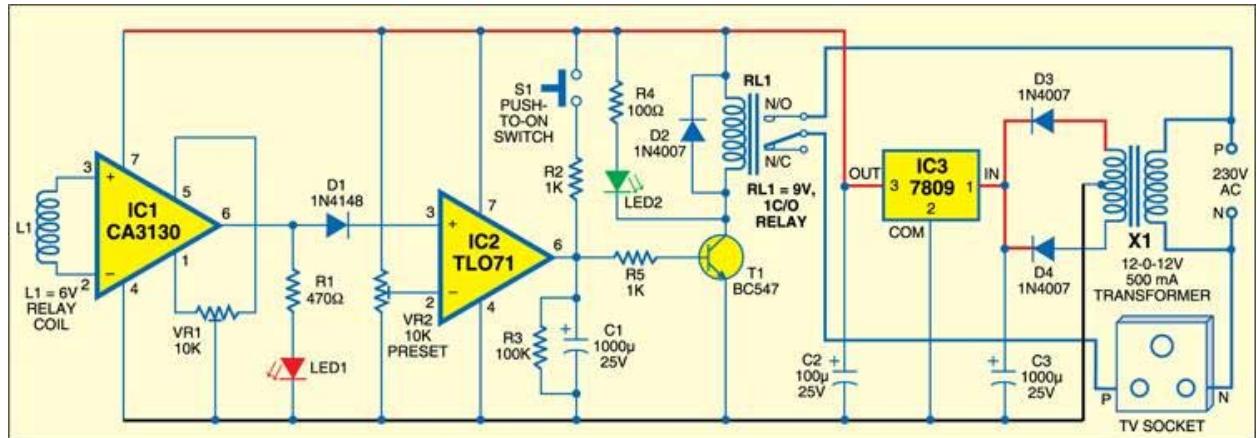
41. Little Power-Hila Vinegar Battery to power a calculator !

LCD calculators draw very little current. This vinegar battery easily runs these devices. Take the back off of an inexpensive calculator, remove the battery extend the two battery wires out the sides then reassemble [39].



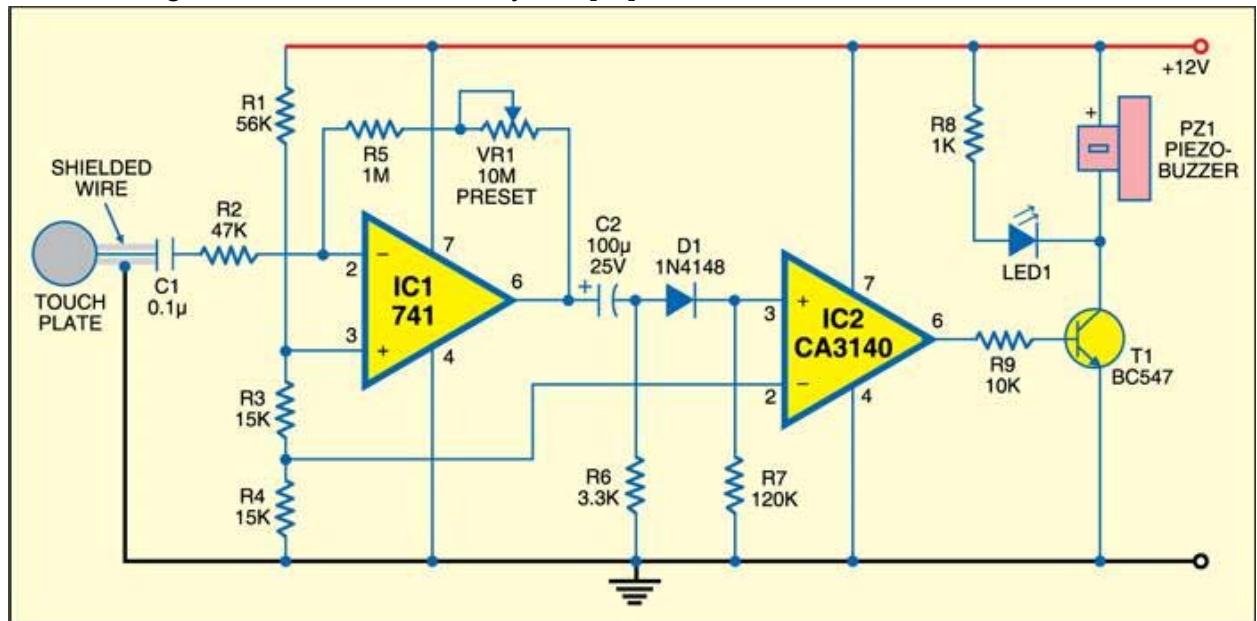
42. Standby Power-Loss Preventer

Electronic devices consume some power even in the standby mode, i.e., when they have been switched off using a remote handset but not the mains power switch. For instance, when a CRT TV or PC monitor is in use, it consumes 80-100 watts of power. In the standby mode too, it draws a few watts of power. Thus if you leave these devices in standby mode for a long time, they may inflate your electricity bill [40].

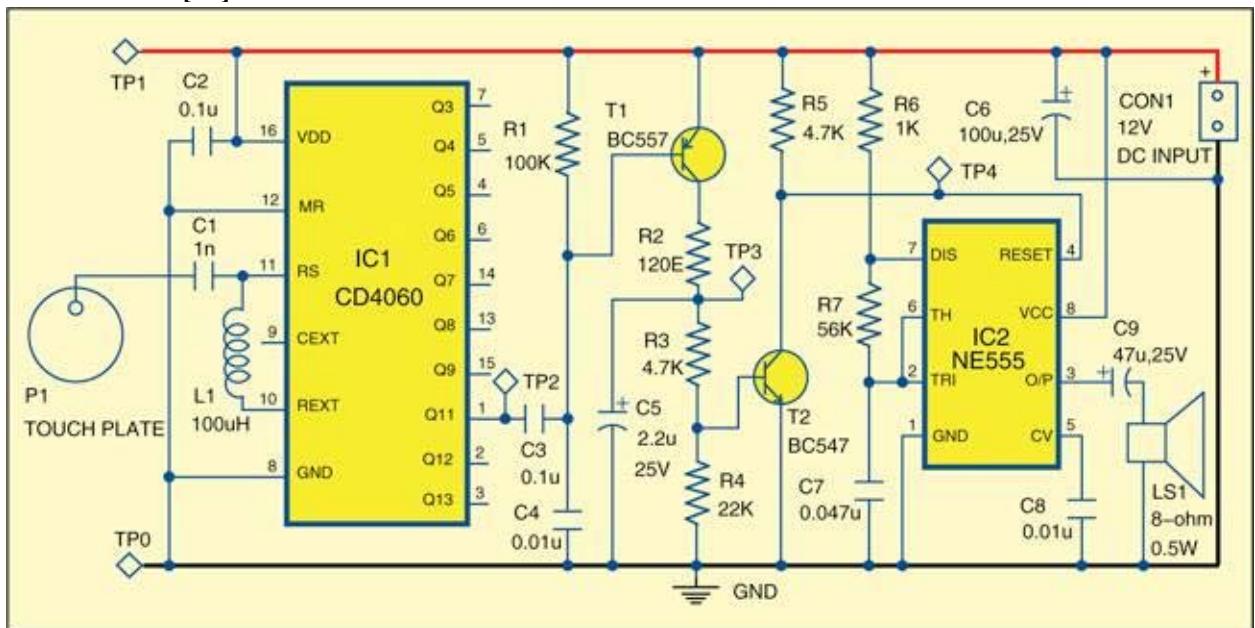


43. Hum-Sensitive Touch Alarm

Radiation signals from mains wiring can travel a few metres of distance. These can be induced by the electromagnetic field in the human body also [41].

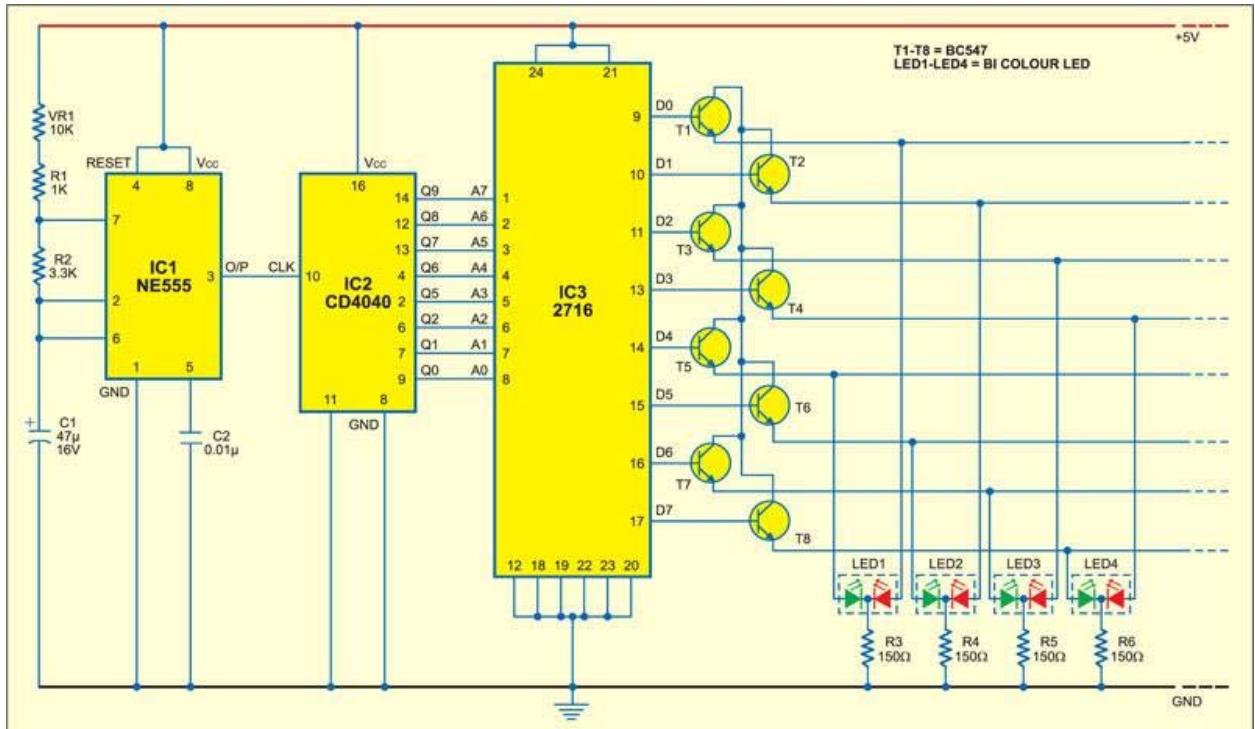


44. Touch Alarm [42]



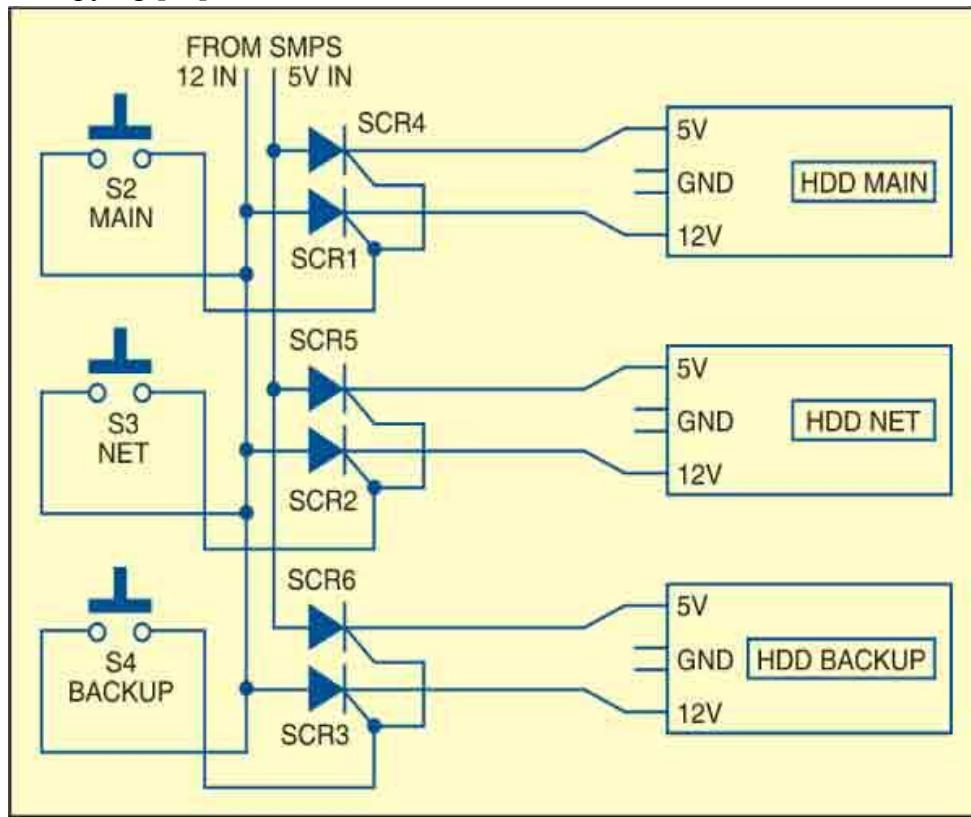
45. Versatile LED Display

This circuit uses an erasable programmable read-only memory (EPROM) to display various light patterns on LEDs. Since bicolour LEDs (comprising green and red LEDs) have been used, display is possible in three colours (green, red and amber) [44].



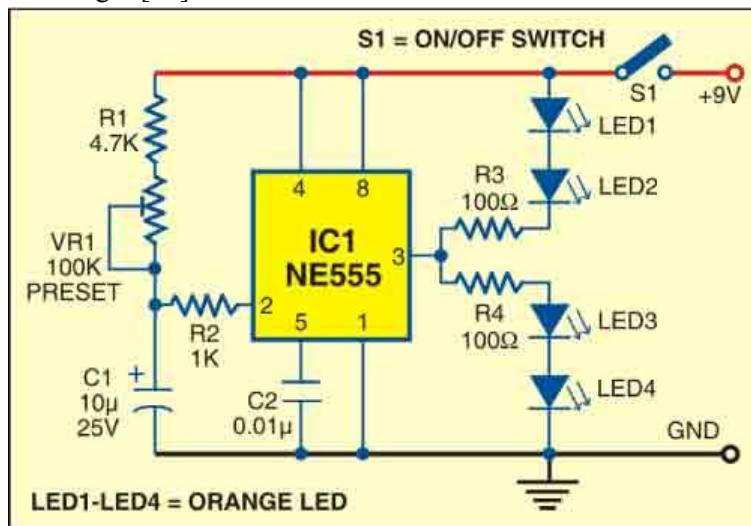
46. HDD Selector Switch

Using the switch-mode power supply (SMPS) of your personal computer, this add-on circuit lets you switch between three hard disk drives (HDDs) and also ensure that nobody else can open your protected HDD. It is quite useful for protection from hacking and spying [45].



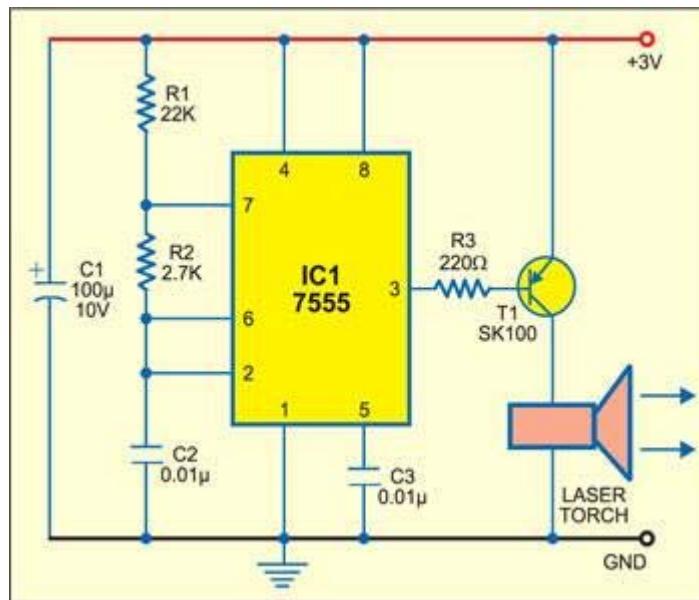
47. Multiutility flash light

This multiutility flash light consists of three sections: a flasher, a sound-to-light display and a white LED-based flashlight [46].



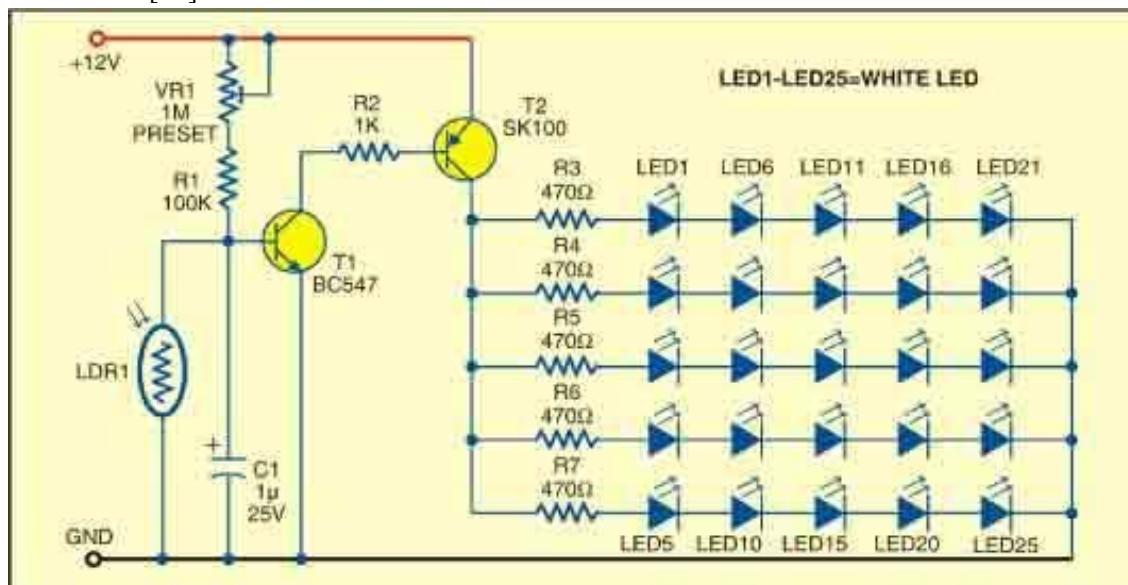
48. Long-range Burglar Alarm Using Laser Torch

Laser torch-based burglar alarms normally work in darkness only. But this long-range photoelectric alarm can work reliably in daytime also to warn you against intruders in your big compounds, etc. The alarm comprises laser transmitter and receiver units, which are to be mounted on the opposite pillars of the entry gate. Whenever anyone enters to interrupt the transmitted laser beam falling on the receiver, the buzzer in the receiver circuit sounds an alarm [47].



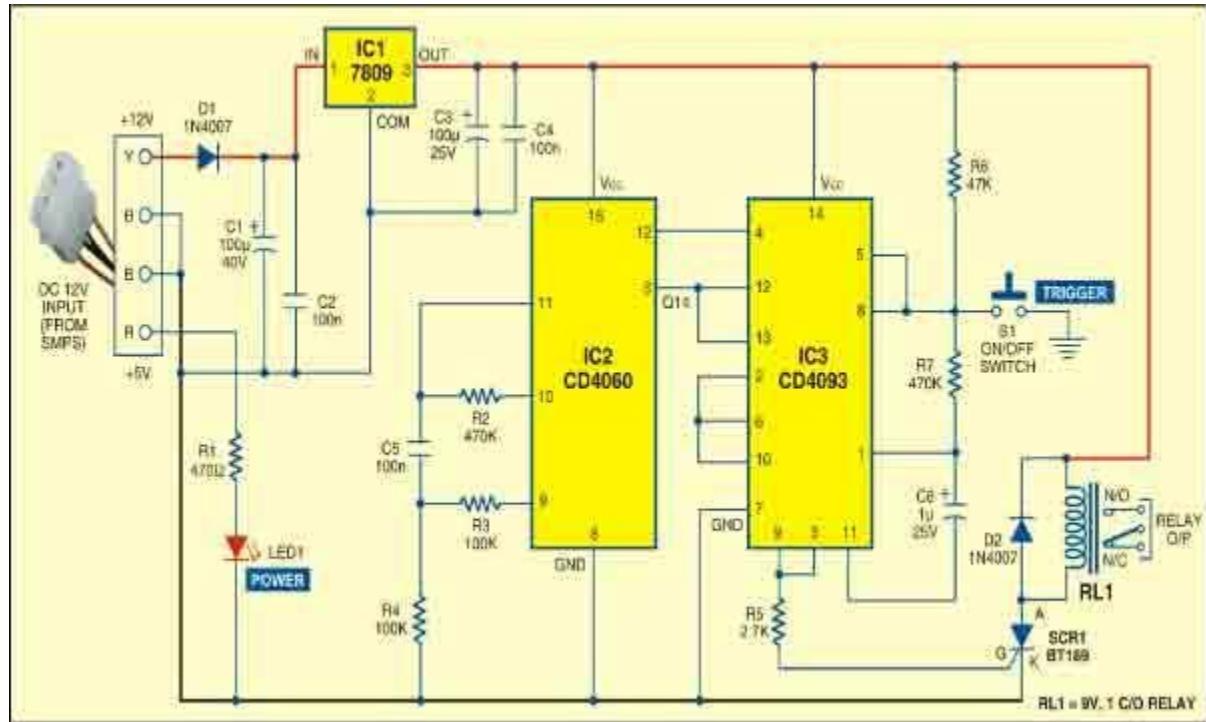
49. Twi-light using white LEDs

This sunlight-controlled lamp uses a light-dependent resistor (LDR) as the sunlight sensor and a total of 25 high-brightness white LEDs. Separate resistors are connected in series with each row of the LEDs [48].



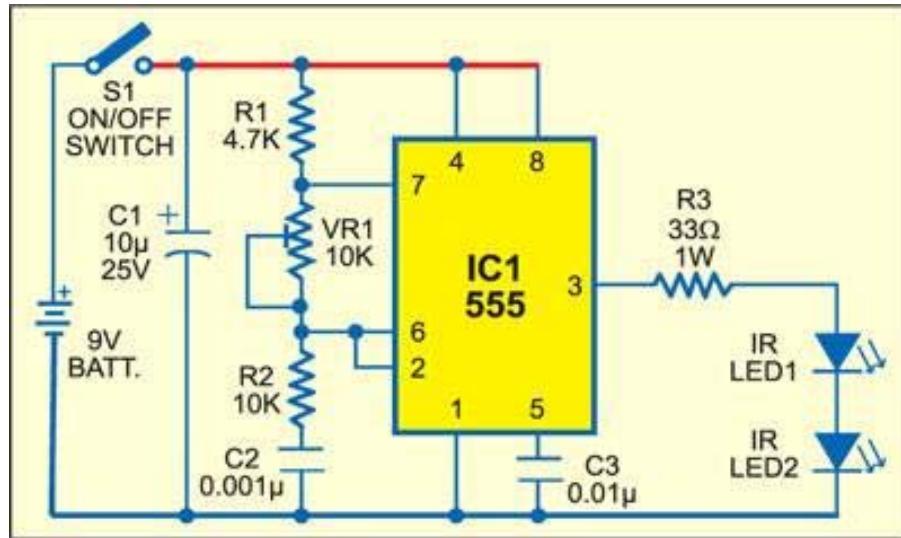
50. PC TIMER

Primarily intended for installation into a desktop PC, this versatile timer with adjustable time output provides controlled ‘on’ time for PC peripherals like printers, scanners and desktop reading lamps. As it is designed for an input voltage of 12 volts, it may also be useful in your lab [49].



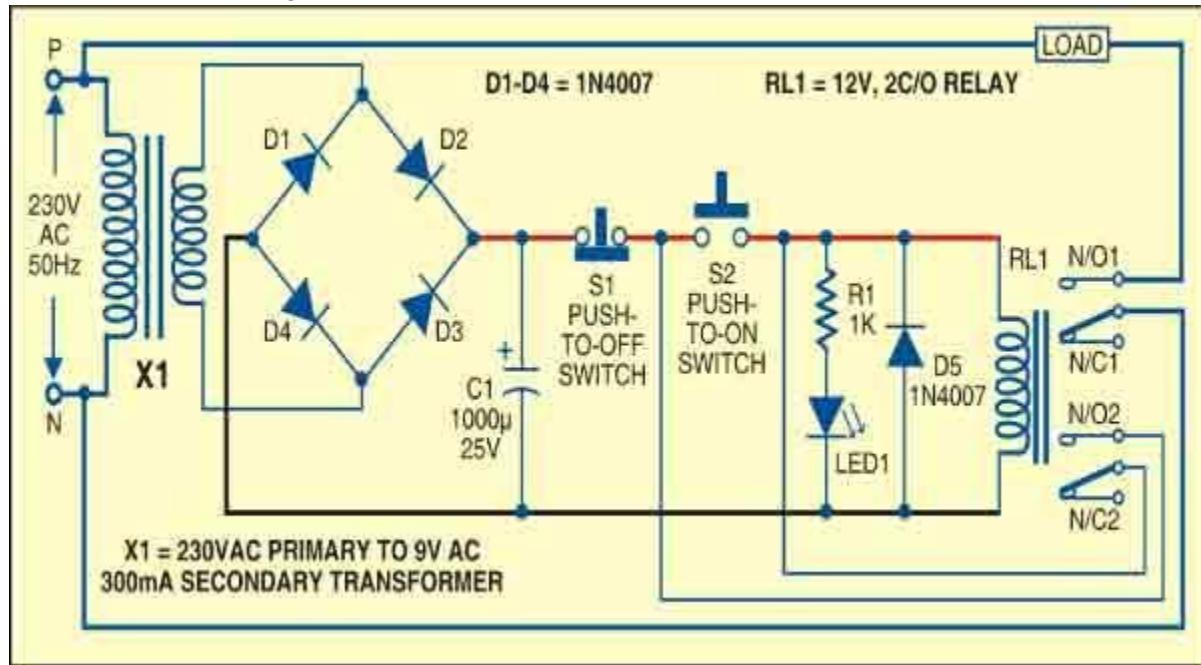
51. Infrared Object Counter

This infrared object counter can be installed at the entry gate to count the total number of people entering any venue. For example, it can be used at the railway stations or bus stands to count the people arriving per day or week [50].



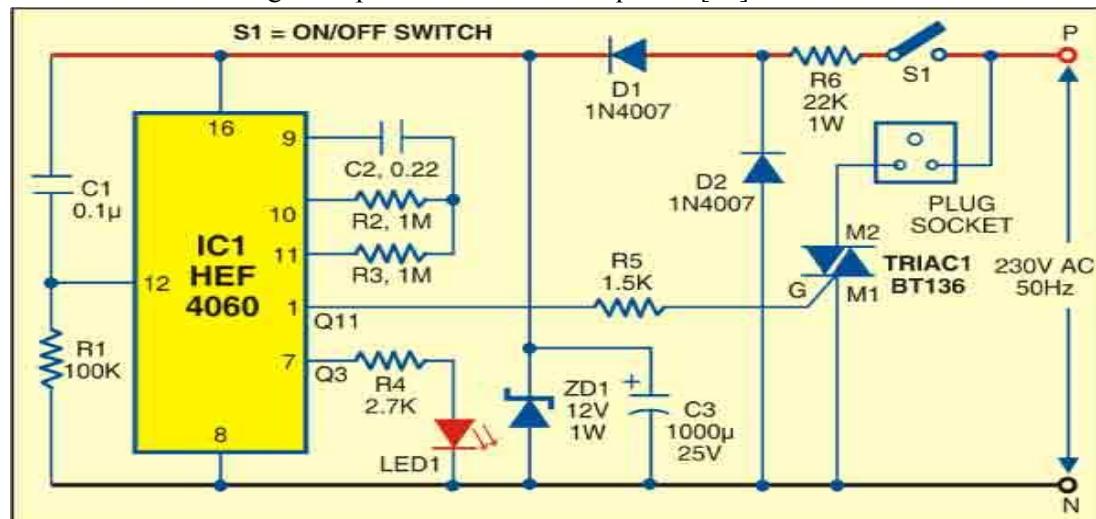
52. Pushbutton Control For Single-Phase Appliances

This circuit lets you switch off and switch on a single-phase appliance using two separate push switches. Such an arrangement is common for industrial motors (mostly 3-phase) where an isolation is required between power and control circuits. Personal protection under faulty conditions is ensured if the relay is placed remotely. The circuit also safeguards costly devices against frequent power cuts as the device turns off in the event of power failure and remains off until it is switched-on again [51].



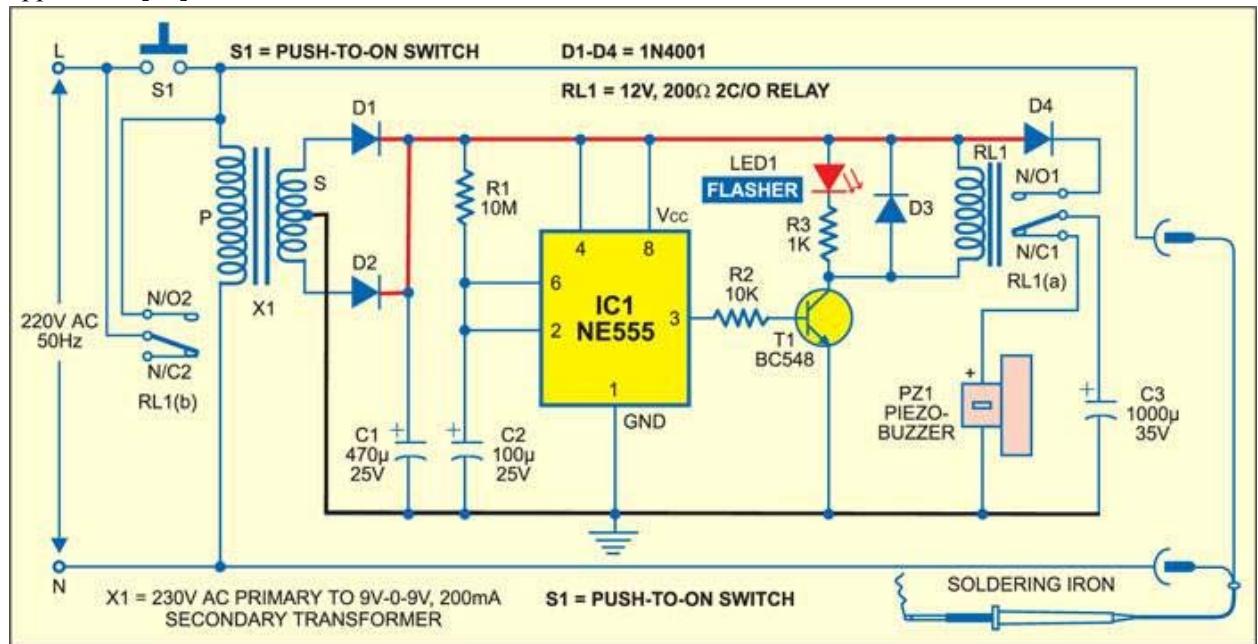
53. Timer for Mosquito Destroyer

In electric-heating mosquito repellents, an electric vaporiser heats up a mat or liquid to release non-degrading chemicals into the air and keep the mosquitoes away from the closed surroundings. Here's a circuit that introduces a time gap in the operation of the va val of 15 minutes without reducing the repellent action on mosquitoes [52].



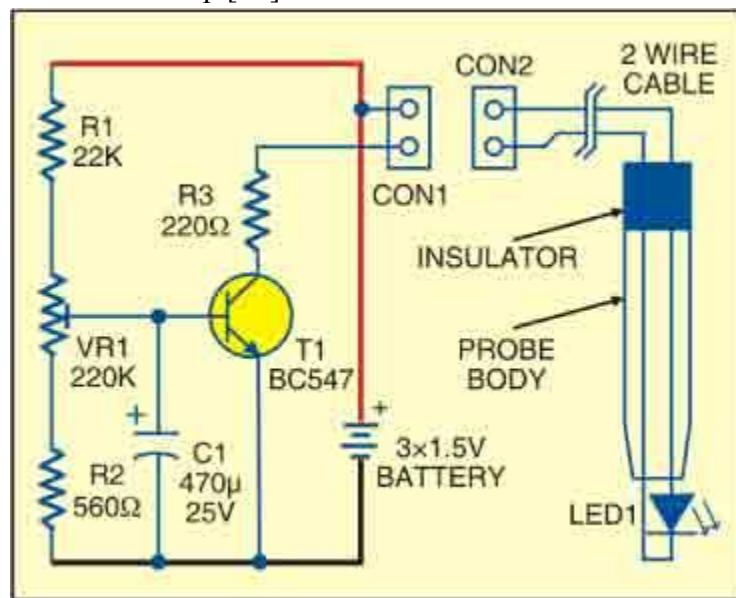
54. Automatic Soldering Iron Switch

Quite often, we forget to turn off the soldering iron. This results in not only a smoking oxidised iron but also waste of electricity. To solve this problem, here's a circuit that automatically switches off the soldering iron after a predetermined time. The circuit draws no power when it is inactive. The circuit can also be used for controlling the electric iron, kitchen timer or other appliances [53].



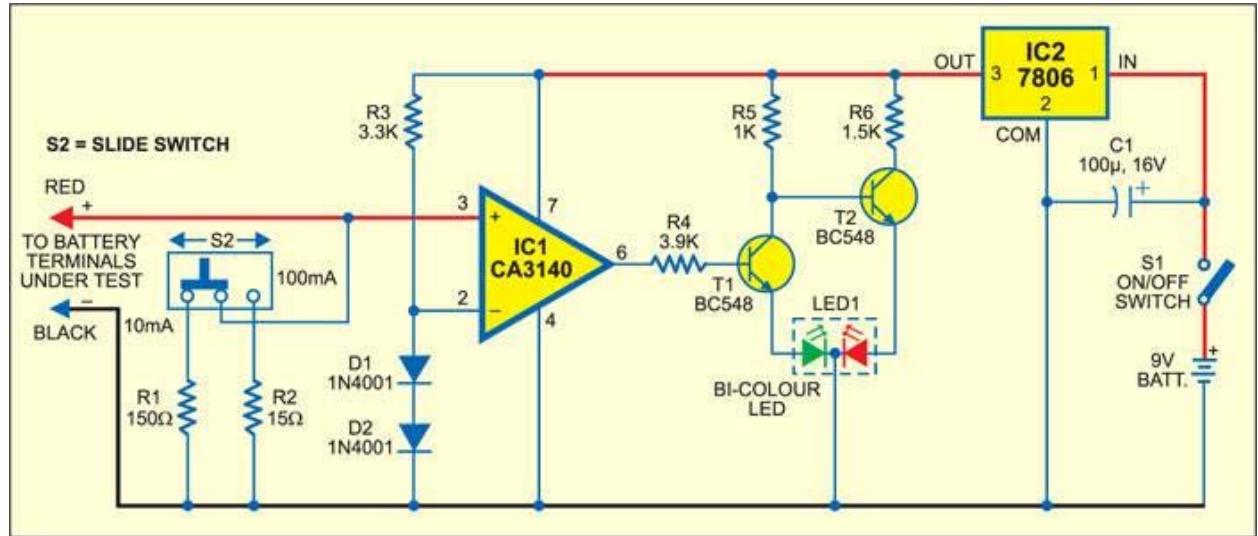
55. White LED Light Probe for Inspection

This circuit is useful for inspecting narrow spaces like the inside of the CPUs, monitors, PCB modules and other electronic devices. The light source is a pencil-thin tube with ultra-bright white LED at the tip [54].



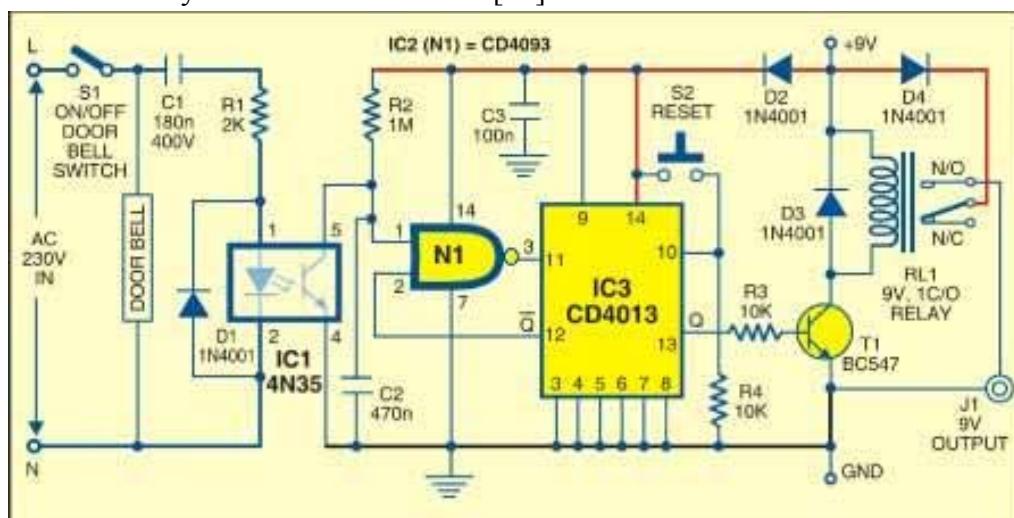
56. Pencell Charge Indicator

Small-size AA cells and button cells used in electronic devices providing a terminal voltage of 1.5V are normally rated at 500 mAh. As the cells discharge, their internal impedance increases to form a potential divider along with the load and the battery terminal voltage reduces. This, in turn, reduces the performance of the gadget and we are forced to replace the battery with a new one. But the same battery can be used again in some other application that requires less current [55].



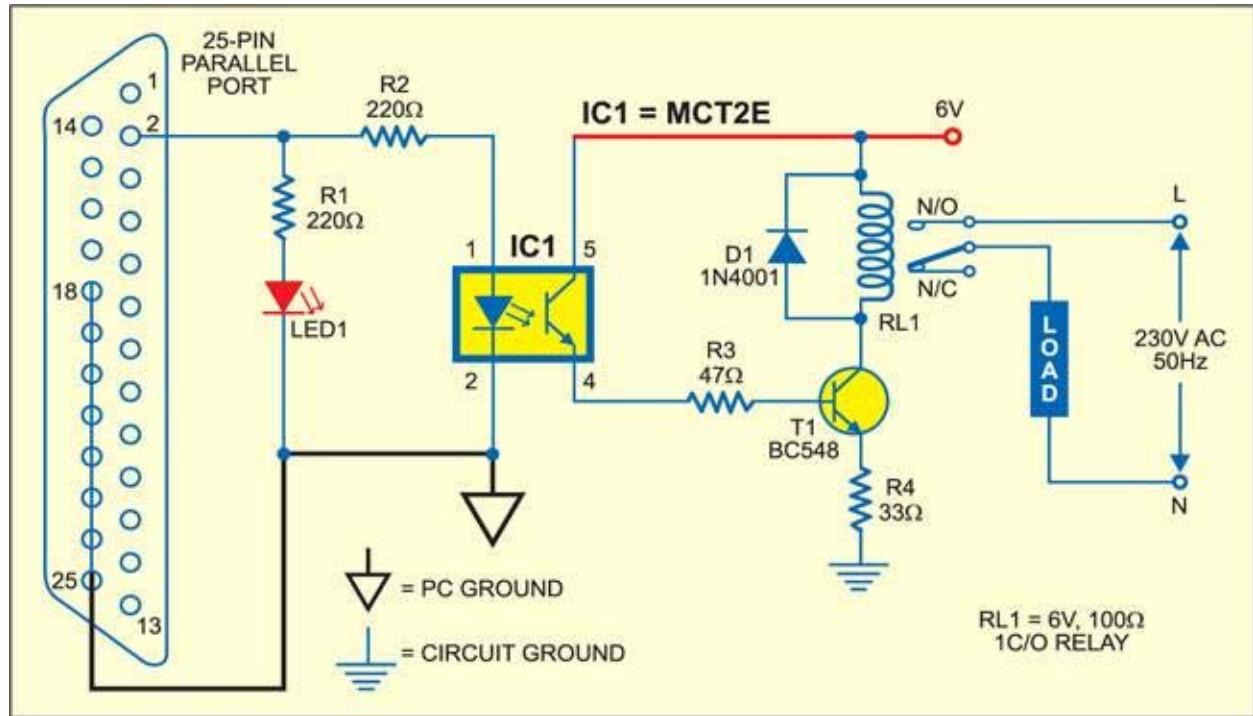
57. Doorbell-controlled Security Switch

One way to check whether anybody is at home is to ring the doorbell. Burglars too use this very technique. The circuit described here comes handy in such a situation. It is a simple doorbell-controlled multi-purpose security switch that instantly powers up a connected security device, say, a night-vision door camera, for functioning. The circuit works off 9V DC supply. The input of the circuit is connected in parallel with the 230V AC electric doorbell. An electromagnetic relay is used at the output of the circuit to activate the security device connected to it [56].



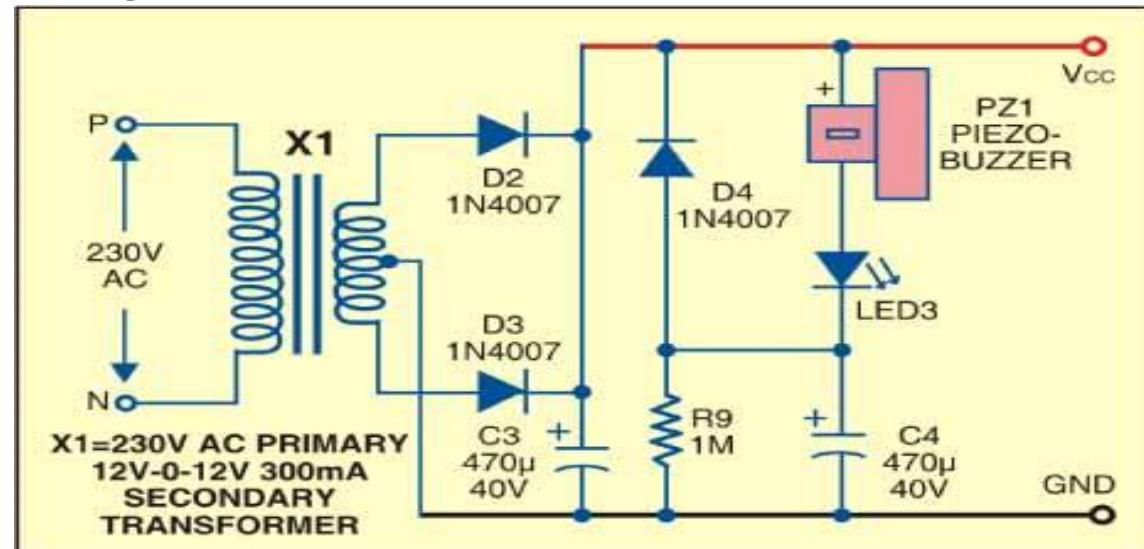
58. PC-Based Timer

Timers are very useful both for industrial applications and household appliances. Here is a PC-based timer that can be used for controlling the appliances for up to 18 hours. For control, the timer uses a simple program and interface circuit. It is very cost-effective and efficient for those who have a PC at workplace or home. The tolerance is ± 1 second [57].



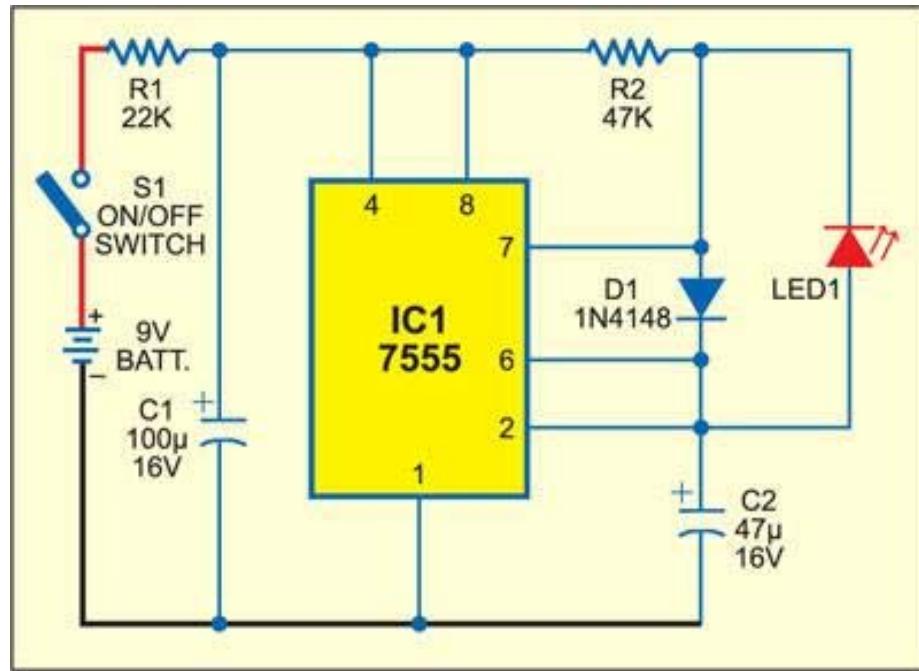
59. Power Resumption Alarm and Low-Voltage Protector

The circuit described here protects your electrical appliances like AC motors from damage due to low voltage at power-on. It remains standby without giving power to the load after power resumes. The load can be switched on only manually. This prevents damage to the device if it is 'on' when power resumes [58].



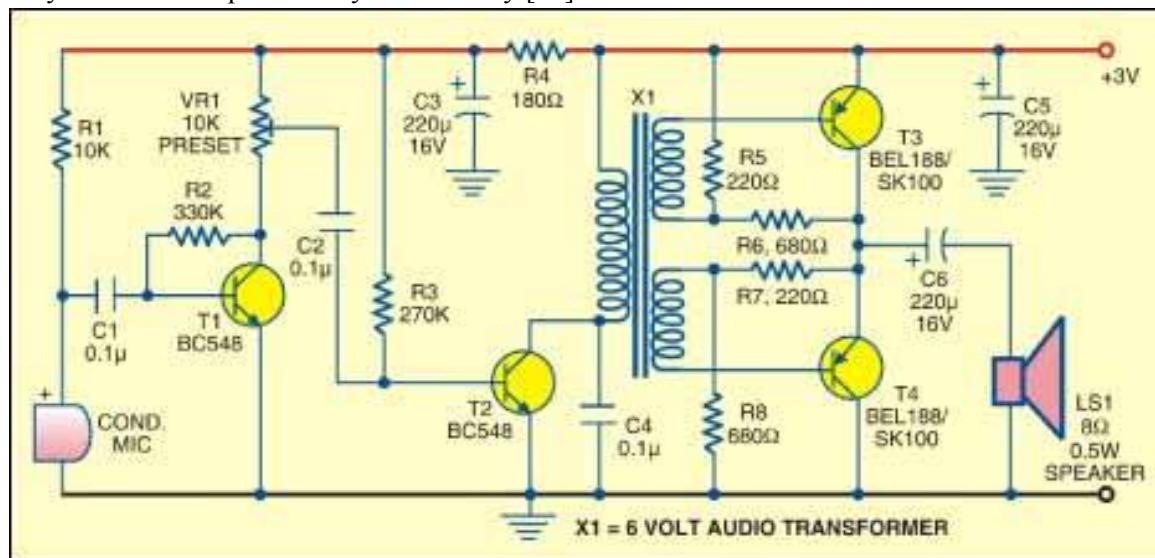
60. Miser Flash

A flashing LED at the doorstep of your garage or home will trick the thieves into believing that a sophisticated security gadget is installed. The circuit is nothing but a low-current drain flasher. It uses a single CMOS timer that is configured as a free running oscillator using a few additional components. As the LED flashes very briefly, the average current through the LED is around 150 μ A with a high peak value, which is sufficient for normal viewing. This makes it a real miser [59].



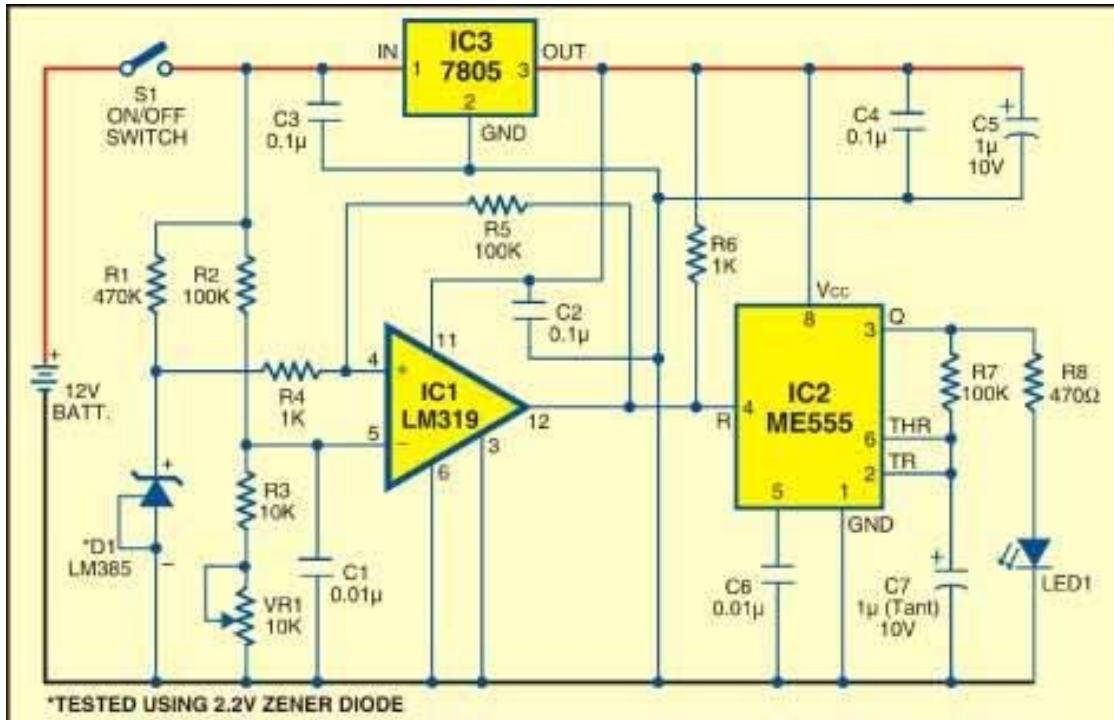
61. Room Sound Monitor

With this simple circuit, you can secretly listen to conversations going on in a room. The circuit is very sensitive and powered by a 3V battery [60].



62. Battery-Low Indicator

Rechargeable batteries should not be discharged below a certain voltage level. This lower voltage limit depends upon the type of the battery. This simple circuit can be used for 12V batteries to give an indication of the battery voltage falling below the preset value. The indication is in the form of a flickering LED [61].



Another circuit

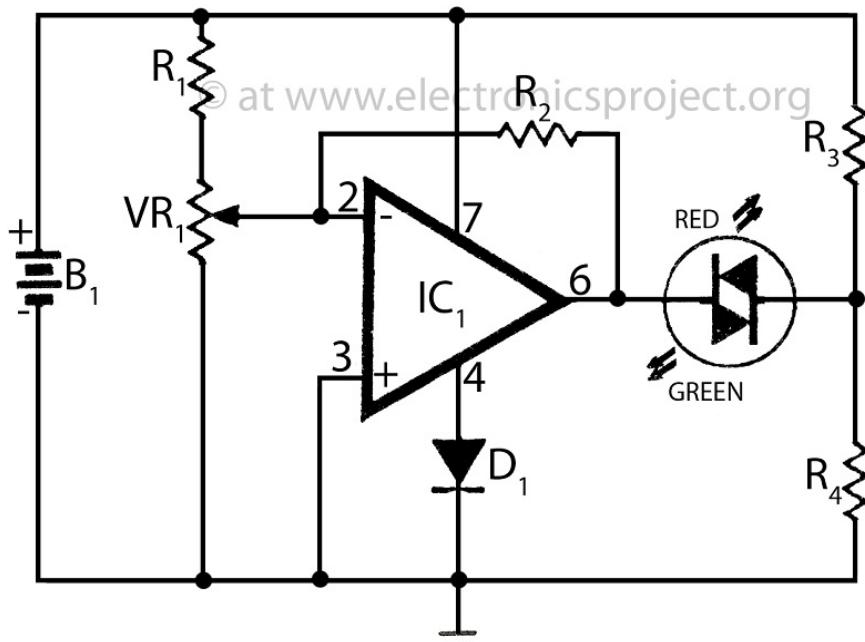


Figure 1: Circuit Diagram of Battery Voltage Monitor

All rechargeable battery has their specific level of charging and discharging, they are likely to get damage if the battery voltage exceeds that level. Here is a simple circuit battery voltage monitor used to indicate the state of battery by monitor them.

Circuit description of battery voltage monitor

The circuit of battery voltage monitor is fabricated and designed around op-amp IC LM709 configured as comparator. Where bi-color LED is used as indicator and indicates three voltage level state of a 12V battery. Resistor R1 with potentiometer VR1 is used as potential driver of voltage monitor circuit.

When voltage level rise above 13.5 volts, the output from IC1 goes low as a result LED begins to emit RED light. Similarly, when the voltage fall below a preset level (10Volts) the output goes high and the LED start to emit GREEN light. Resistors R3 and R4 is used as current limiter of LED.

NOTE: Adjust VR1 such that LED begins to emit GREEN light when 10V DC is connected.

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1 = 1 K Ω ; R2 = 18 K Ω ; R3, R4 = 680 Ω

VR1 = 10 K Ω (Potentiometer)

Semiconductors

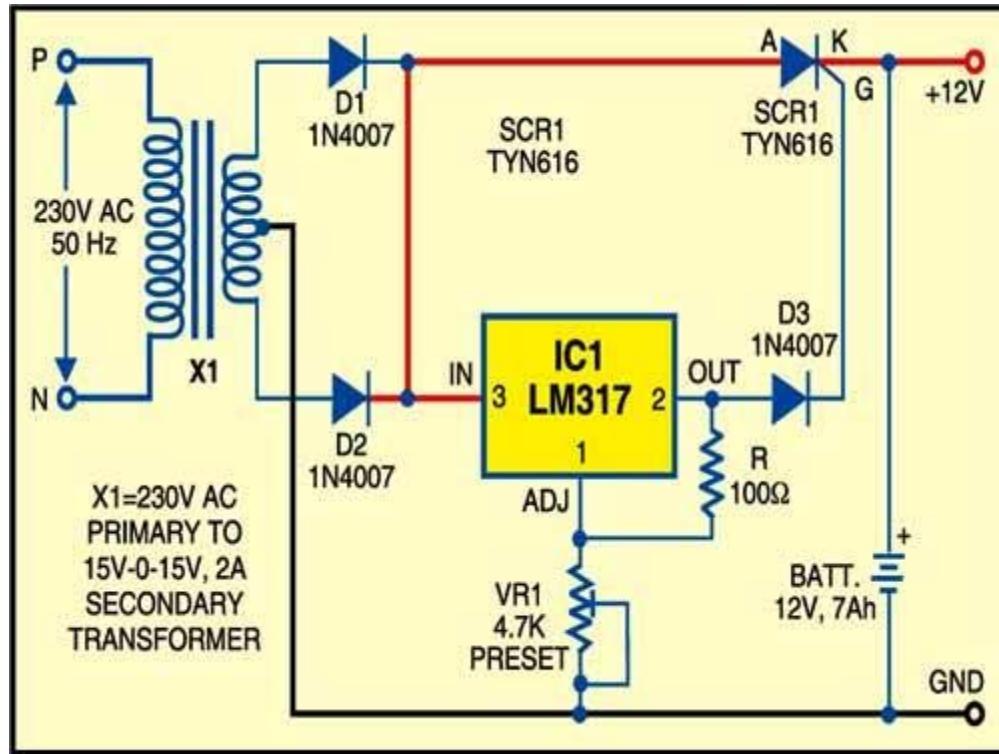
IC1 = LM709; D1 = 1N4003

Miscellaneous

B1 = 12V Battery; LED = Bi-color LED

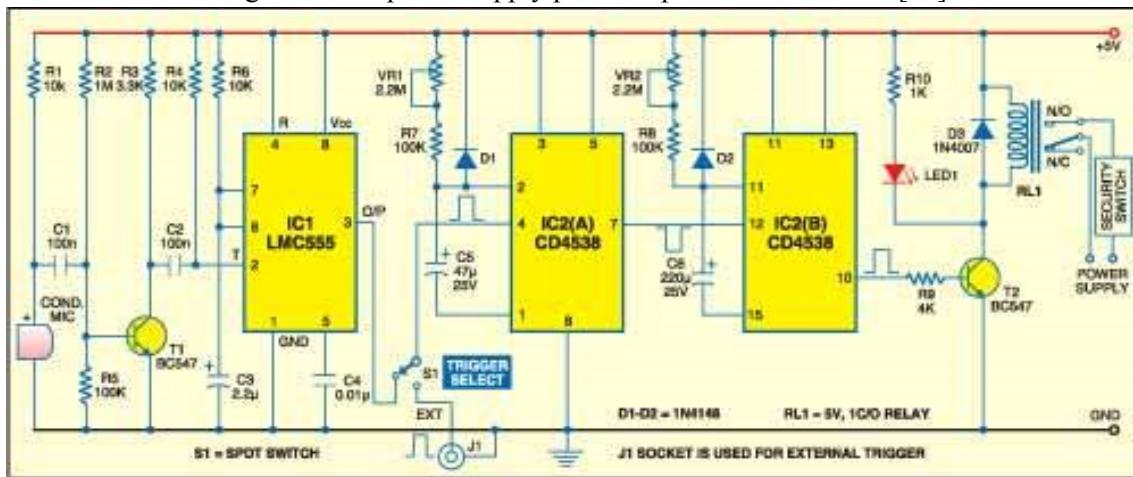
63. Micro Inverter

A simple low-power inverter circuit is described here, which converts 12V DC into 230V AC. It can be used to power very light loads like night lamps and cordless telephones, but can be modified into a powerful inverter by adding more MOSFETs. This circuit has two stages-battery charger with cut-off, and battery level indicator and inverter circuit. Charging circuit is built around IC1 (LM317) as shown in Fig. 1. When mains 230V AC is available, IC1 provides gate voltage to SCR1 (TYN616) through diode D3 (1N4007). SCR1 starts charging the battery. For output voltage setting preset VR1 may be used [62].



64. Security System Switcher

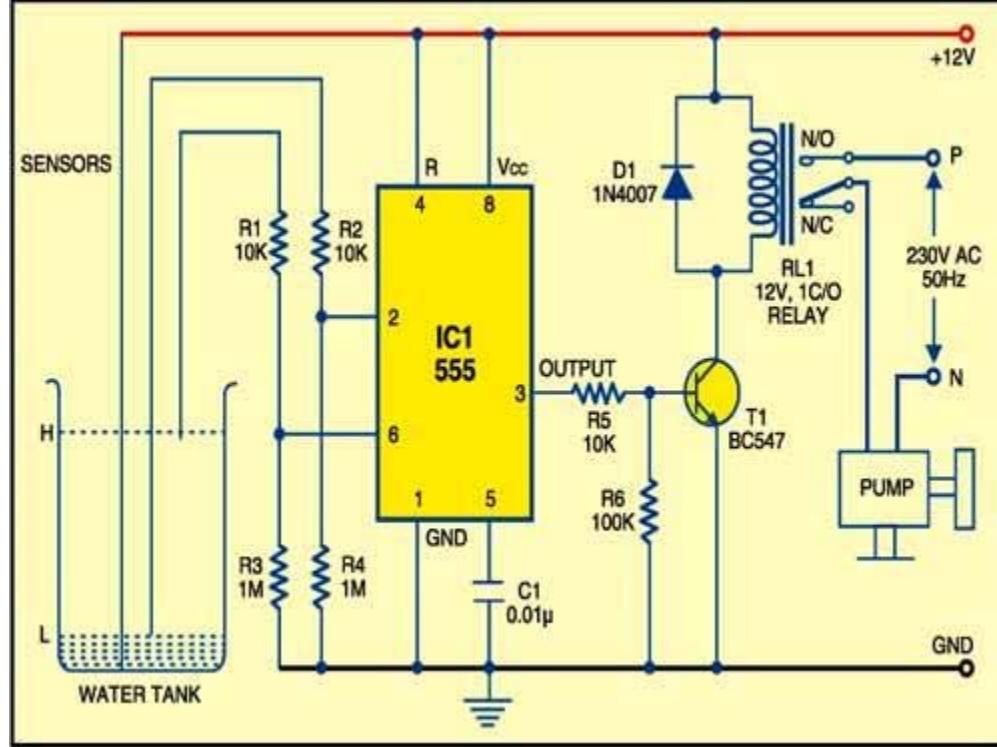
An audio signal can be used as a form of input to control any security system. For example, an automatic security camera can be configured to respond to a knock on the door. The circuit described here allows the security system to automatically turn on. It uses a transducer to detect intruders and a 5V regulated DC power supply provides power to the circuit [63].



65. Another Water Pump Controller circuit

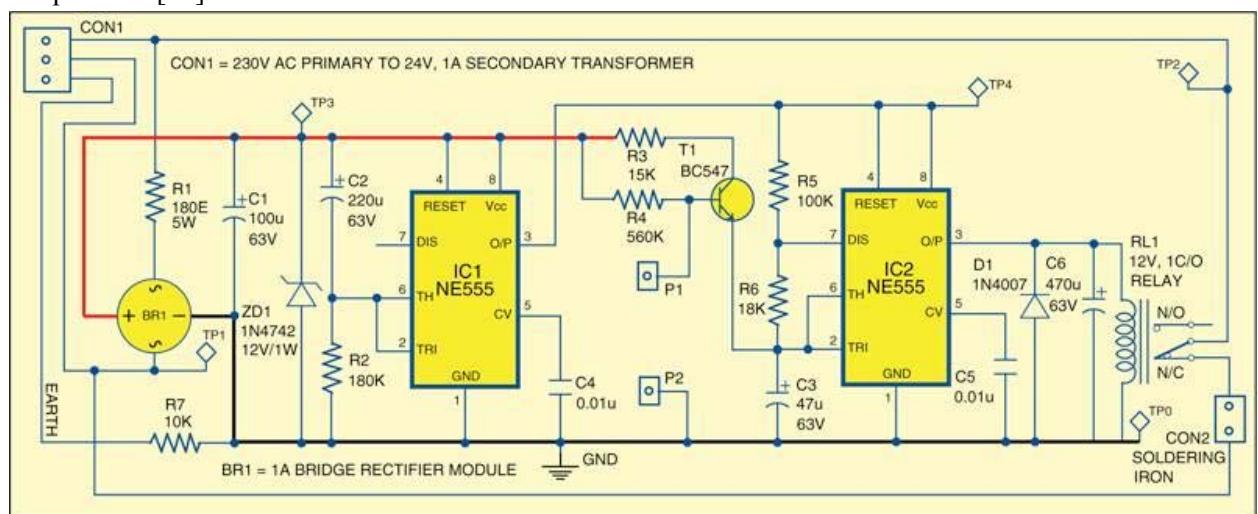
A water pump controller senses the level of water in a tank and drives the water pump. The circuit described here is built around timer IC1 (555). When the water level of tank goes below the low level marked by 'L' the voltage at pin 2 of IC1 becomes low. As a result, internal SR-flip-flop of IC1 resets and its output goes high. This high output pin 3

of IC1 drives relay driver transistor T1 (BC547) and energises relay RL1. Water pump gets mains power supply through n/o contacts of the relay and is powered on. It starts filling water in the tank [64].



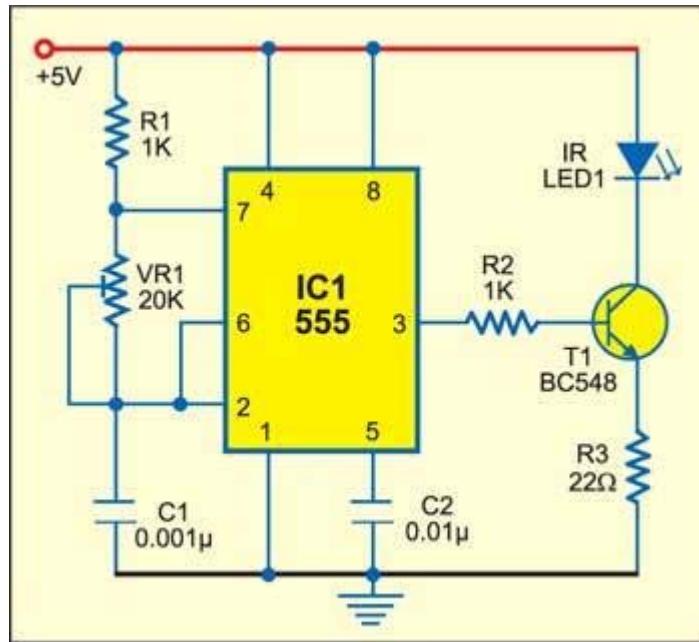
66. Soldering Iron Tip preserver

Although 60/40 solders melt at about 200°C, the tip temperature of a soldering iron should be about 370°C. This is necessary to make a good joint quickly without the risk of overheating delicate components. One should not hold the tip of the iron to the joint for too long at such high temperature [65].



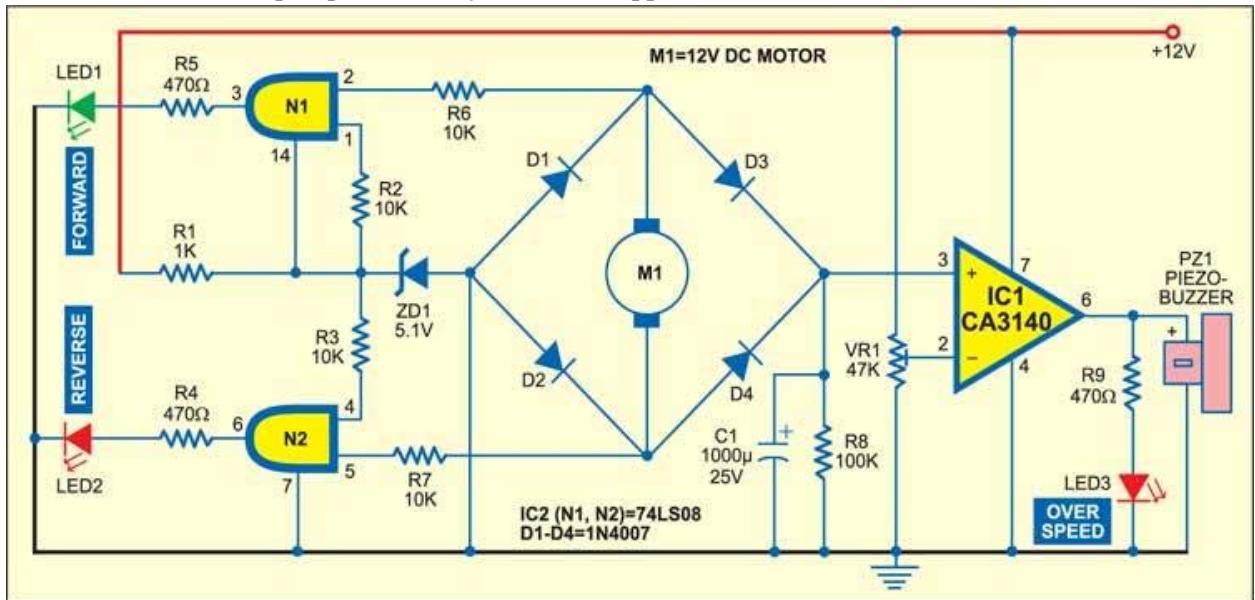
67. Automatic Washbasin Tap Controller

Make your washbasin tap work automatically when you put your hands just below the water tap outlet. This infrared-based system detects any interruption of the IR rays by your hands or utensil and water automatically starts flowing out of the tap [66].



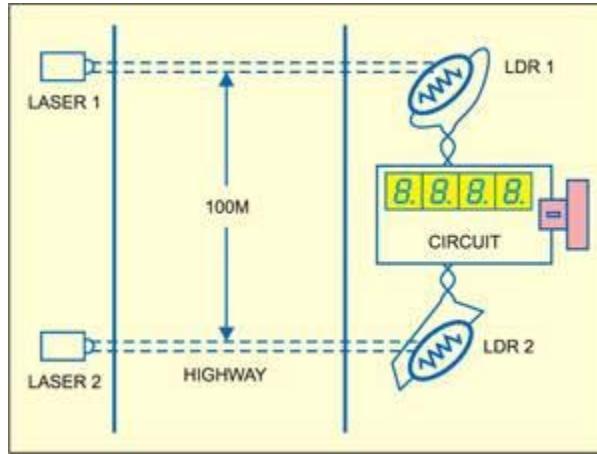
68. Over-Speed Indicator

This circuit is designed for indicating over-speed and direction of rotation of the motor used in mini hand tools, water pump motors, toys and other appliances [67].



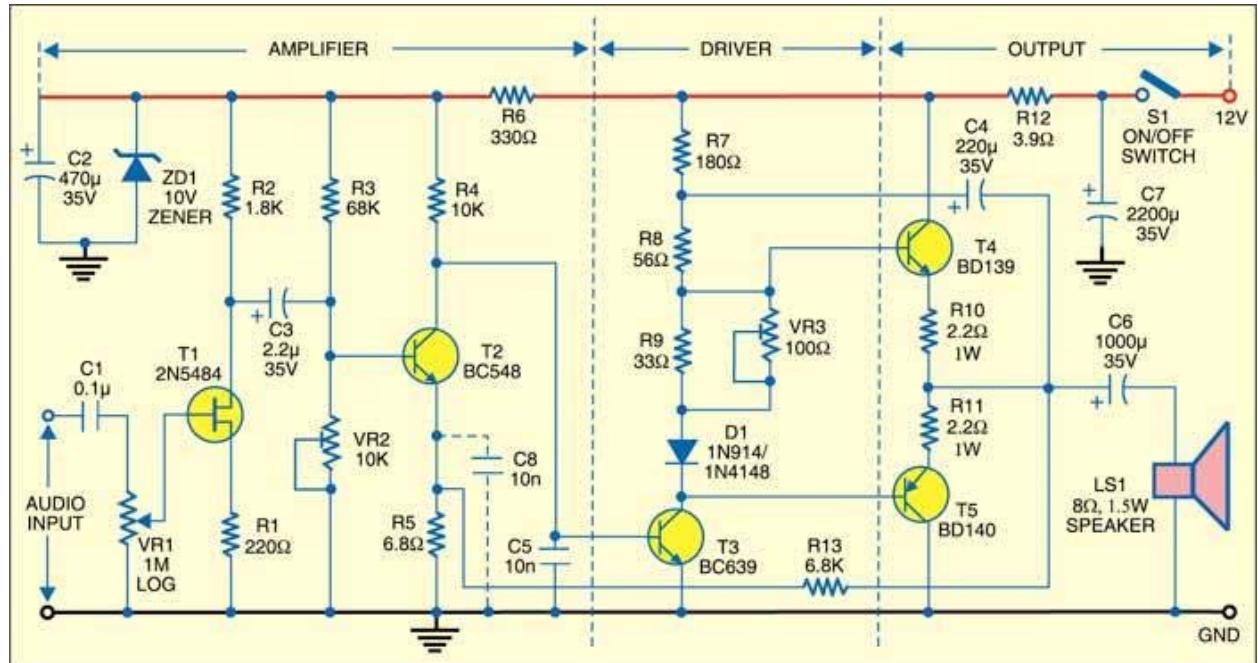
69. Speed Checker for Highways

While driving on highways, motorists should not exceed the maximum speed limit permitted for their vehicle. However, accidents keep occurring due to speed violations since the drivers tend to ignore their speedometers [68].



70. 1.5W Power Amplifier

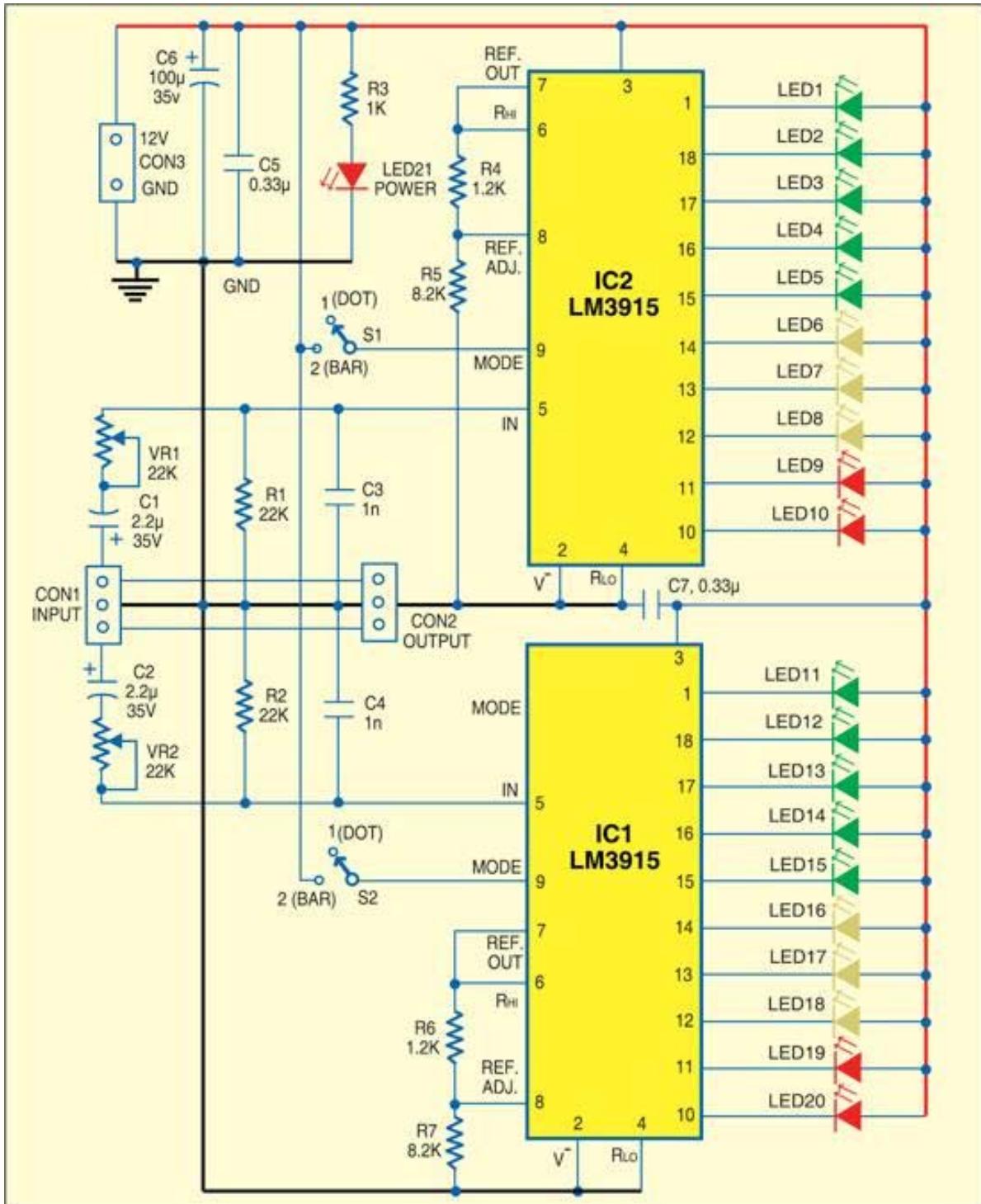
Here we put all the theory to work and present a simple power amplifier module that can be easily built with readily available components. The block diagram of the amplifier is shown in Fig. 1. It is typical of most audio amplifiers, although the circuit is somewhat different [69].



71. Simple Stereo Level Indicator

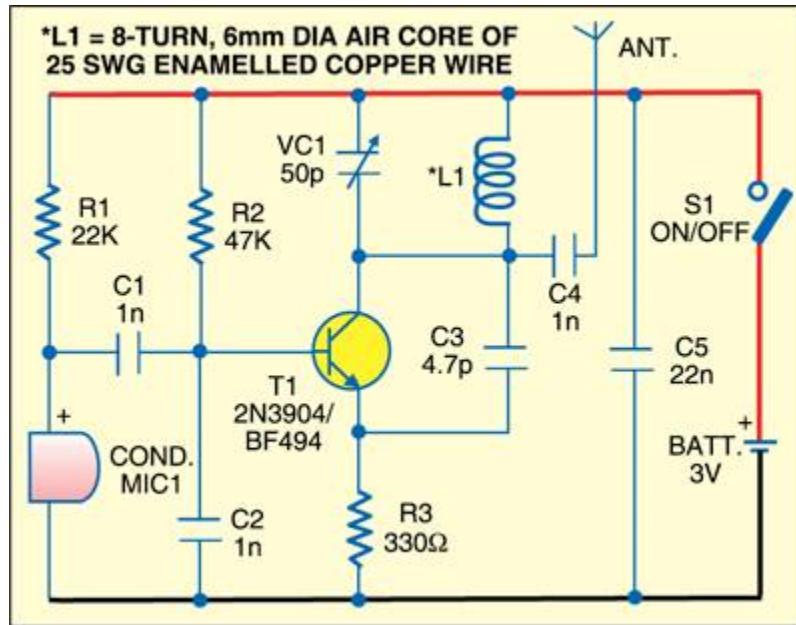
Usually, low-priced home stereo power amplifiers don't have output level indicators. An output power level indicator can be added to each channel of these stereo power amplifiers. As low levels of the output power are not disturbing and damaging to the

people, there is no need to add a preamplifier and low-level detector before IC LM3915. But you should know when the output power becomes considerably high [70].



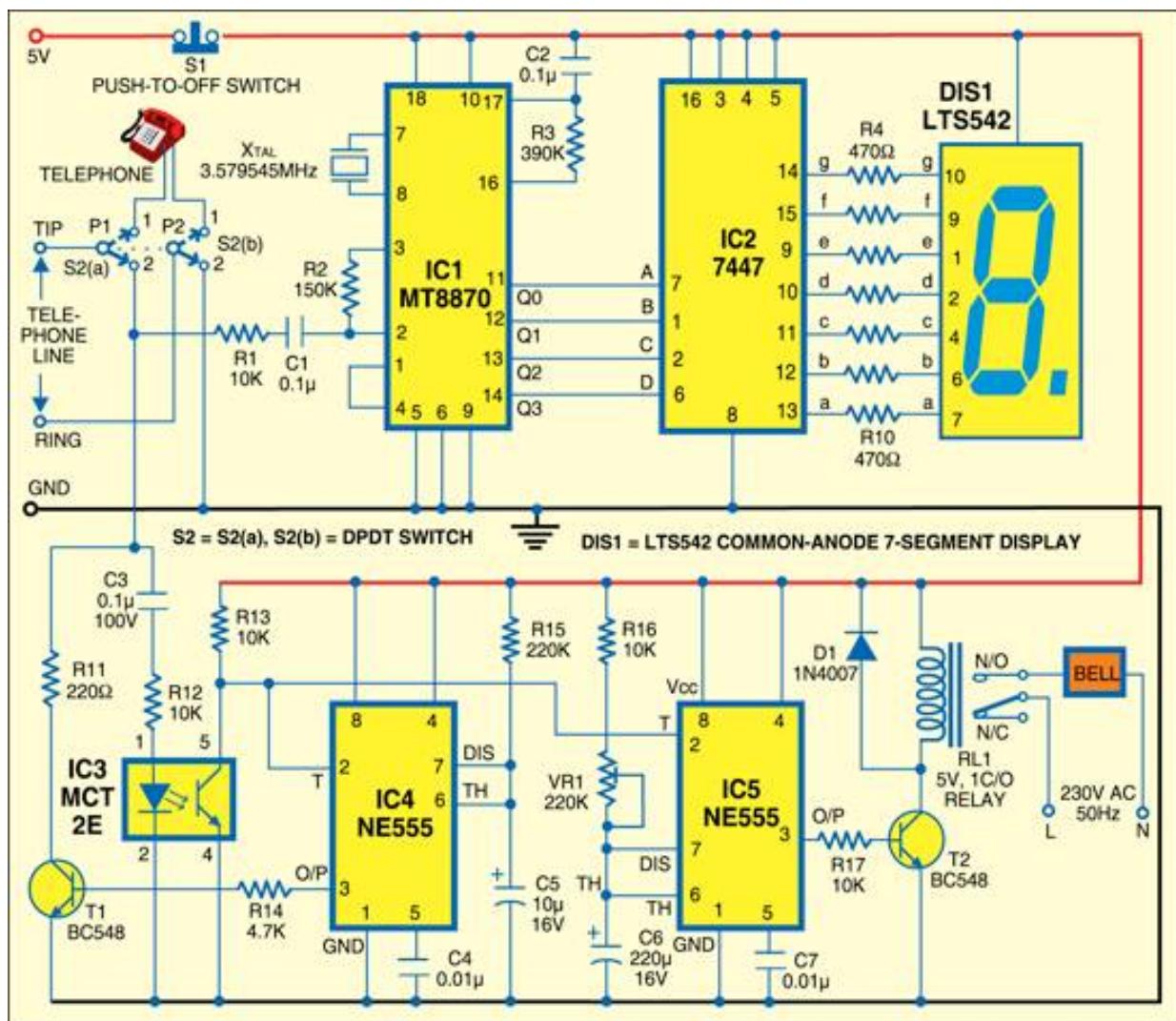
72. FM Bug

This FM bug transmitter circuit will let you spy on people. The transmitter can be placed in the desired room and the conversation heard from a place far away just using a regular FM radio set [71].



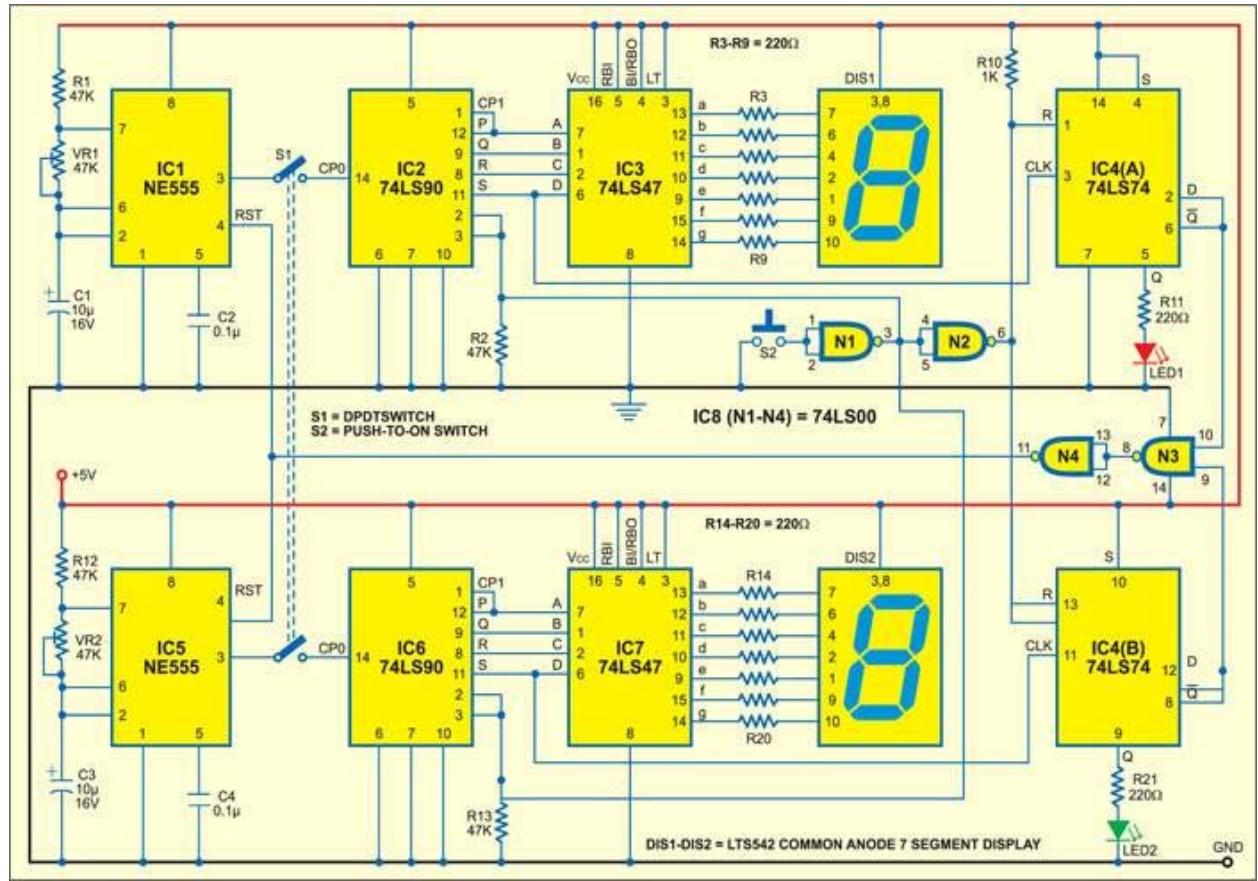
73. Calling Bell Using an Intercom

Here is a simple calling bell circuit that can be used in small offices to call the office boy using an existing intercom system. The office boy can be called from up to nine locations where extension lines are installed. The system is connected to a dedicated extension for the office boy. Whenever someone needs the office boy's assistance, he can dial the office boy's extension number through the intercom and then press a key to indicate his location number (say, 5). This number will be displayed on a seven-segment display and at the same time a bell will sound to alert the office boy. Pressing a switch will clear the display [72].



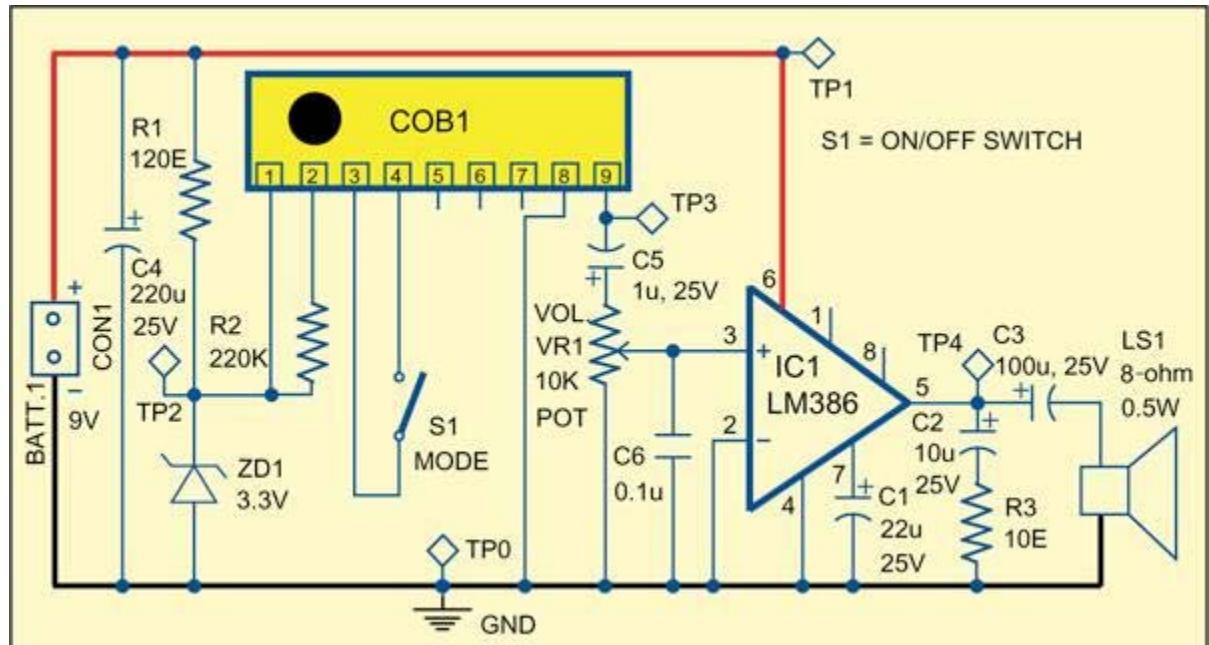
74. Digital Frequency Comparator

Here's a digital frequency comparator for oscillators that indicates the result through a 7-segment display and a light-emitting diode (LED). When the frequency count of an oscillator is below '8,' the corresponding LED remains turned off. As soon as the count reaches '8,' the LED turns on and the 7-segment display shows '8' .[73].



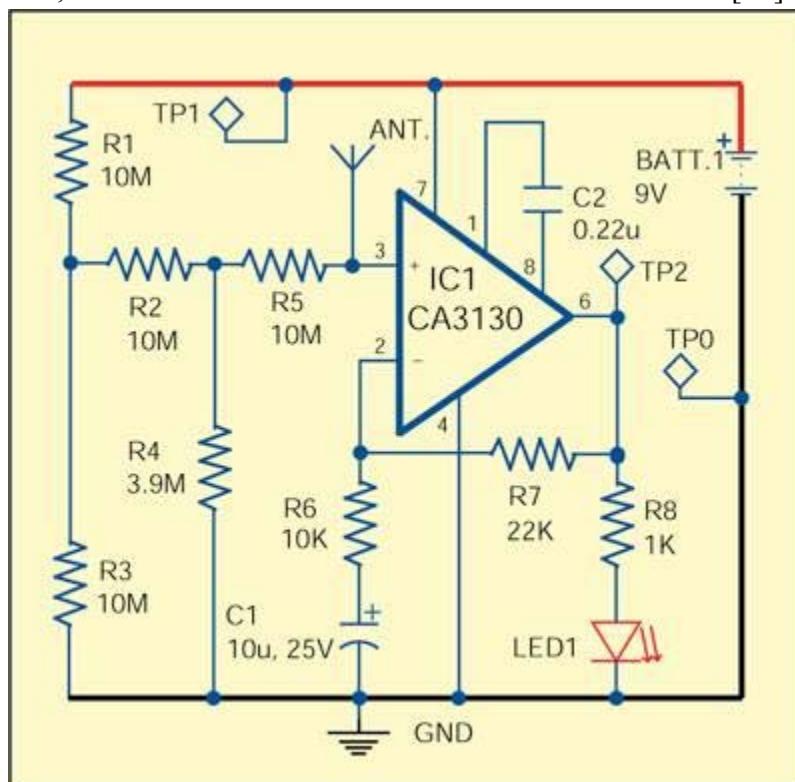
75. Bhajan and Mantra Chanting amplifier

People in India like to chant various mantras as they believe it brings good luck, peace of mind and helps in concentration. Here we present the circuit of an electronic chanting device having nine bhajans and one mantra to choose from [74].



76. Cable Tester

Have you ever wondered if a particular cable is delivering mains power supply to your device or not? Here is a solution that helps you test cable continuity without requiring any physical contact with the bare cable. The circuit practically detects AC signal frequencies and gives an LED indication if the cable is conducting. The circuit is highly sensitive and can detect signals from the surface of the cable itself and thus no direct contact with the bare cable is necessary. The circuit can be used to test other cables, including modem, audio/video and dish antenna cables to name a few [75].



Another Circuit

Co-axial cable is used as a transmission line for radio frequency signals. But sometime it is difficult to detect transmitted signal from input to output. Now, here is a simple project “Co-axial cable tester” by innovative group Dreamlover technology using quad 2-input NOR gate IC 4001. Testing of co-axial cable is gone by connecting to point A and B as shown in circuit diagram. Glowing LED1 indicate string of cable is internally joined; where glowing LED2 indicate the cable is open and glowing LED3 indicate cable is good. Short-circuit of cable is indicated by glowing two different LEDs. In this way “co-axial cable tester” is used to check whether the cable is open, short-circuit or good by glowing different LEDs

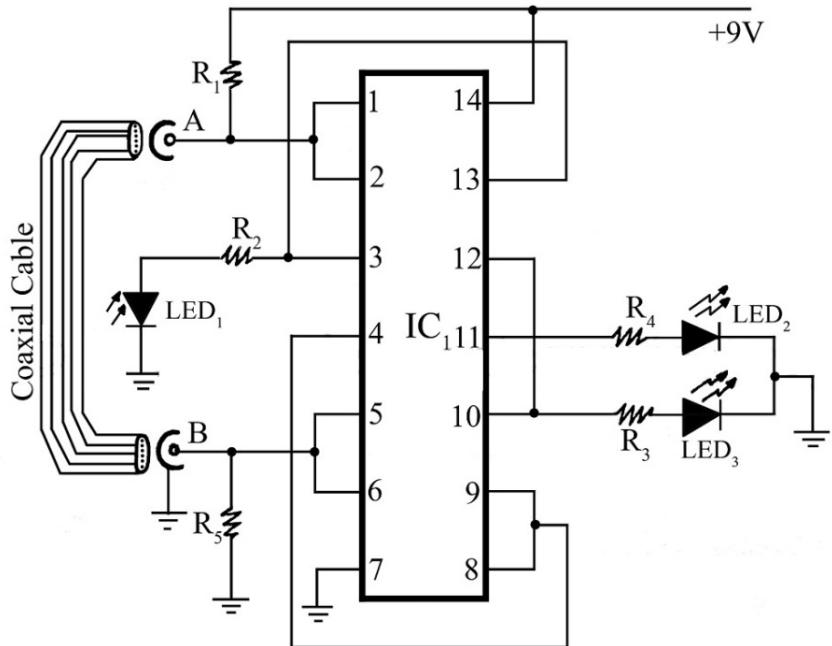


Figure 1: Circuit Diagram of Coaxial Cable Tester

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

R1 – R4 = 1 K Ω ; R5 = 100 K Ω

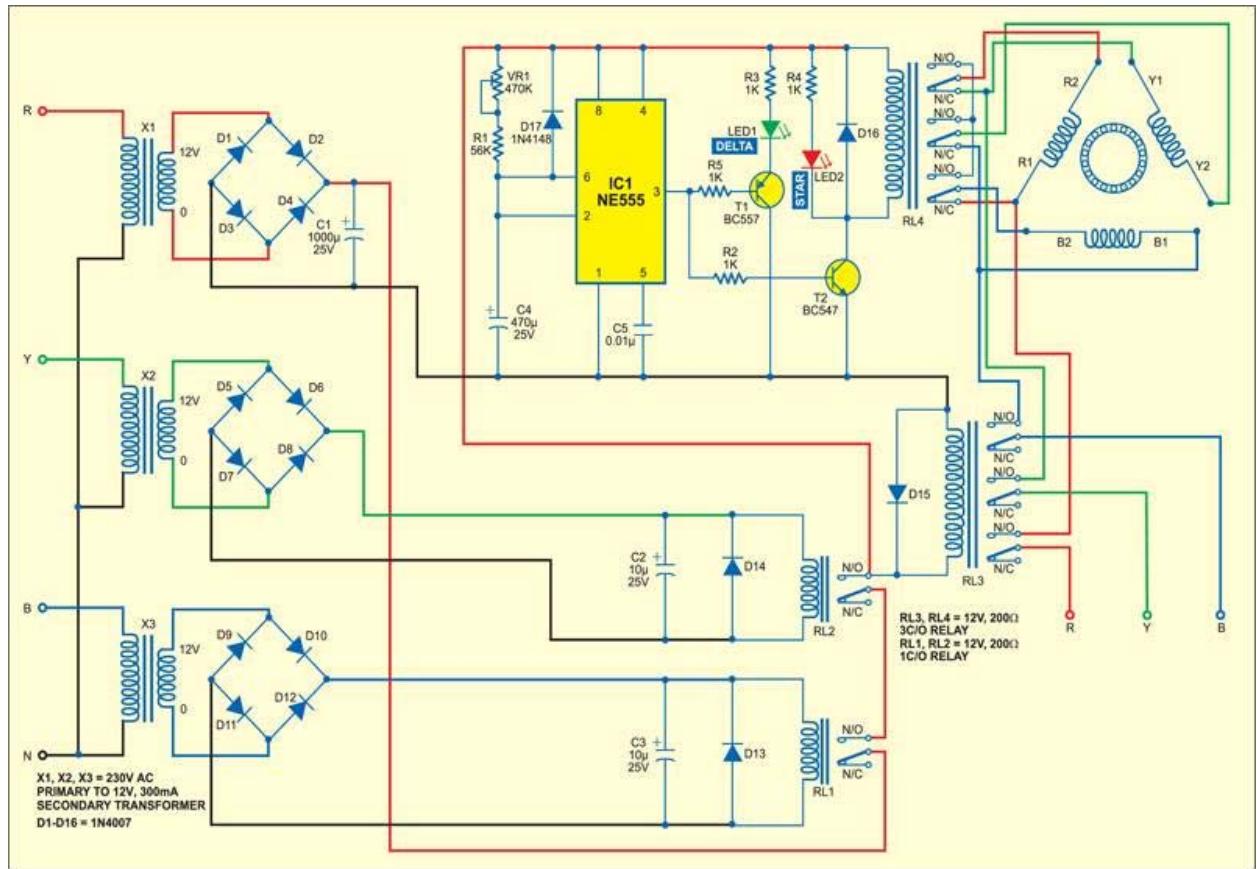
Semiconductors

IC1 = 4001 (quad 2-input NOR gate)

LED1 = Red; LED2 = yellow; LED3 = Green

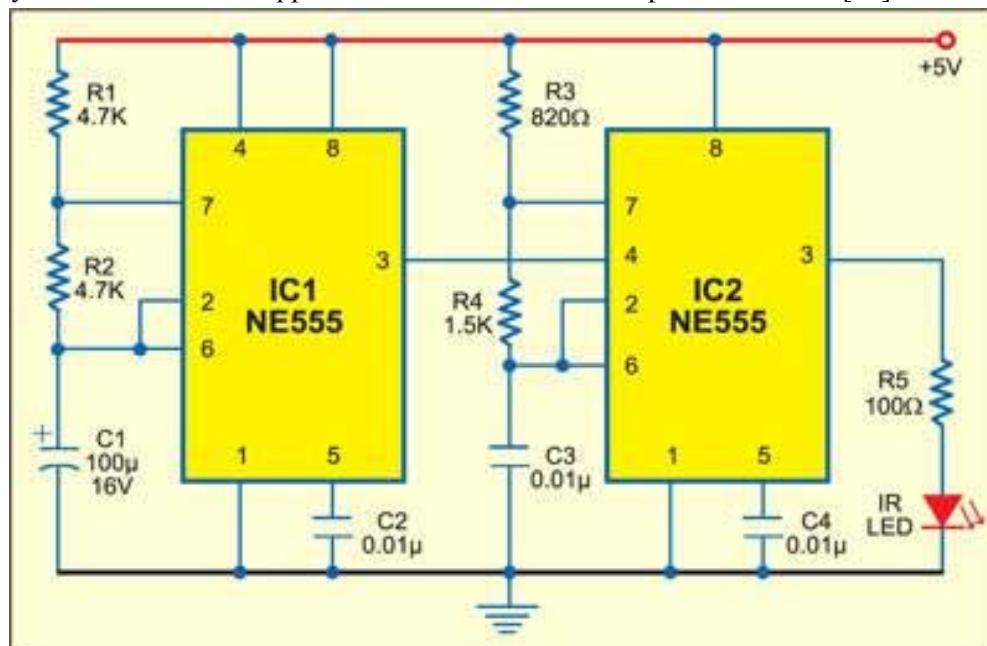
77. Automatic 3-Phase Induction Motor Starter

Starters for 3-phase squirrel-cage induction motors often use star-to-delta converters. The stator coils of the motor are connected in star configuration at the time of power-on and switched to delta configuration when the motor reaches 3/4th of its full speed, after the stator coils have developed sufficient back electromagnetic force (emf) [76].



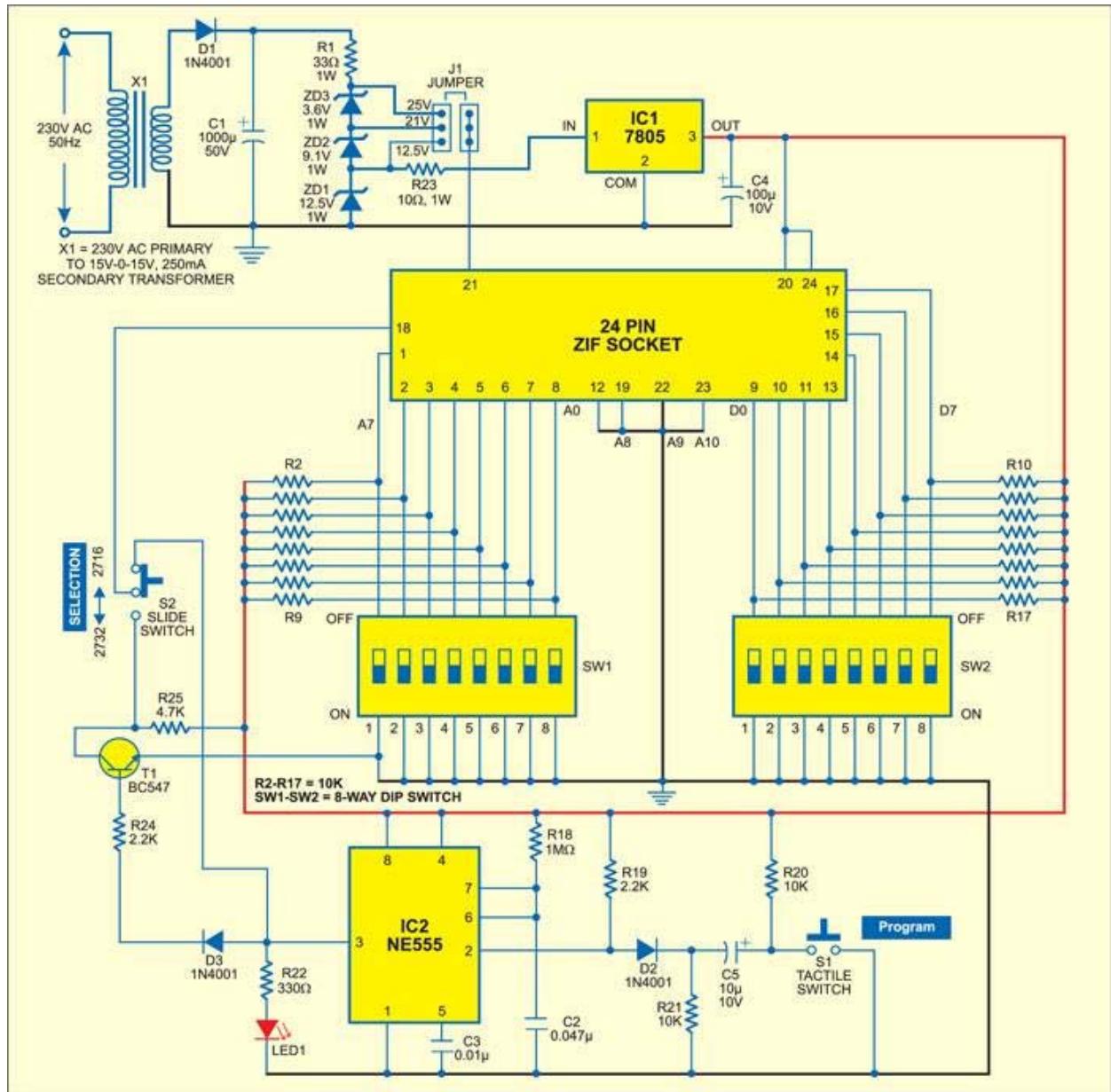
78. Wireless Stepper Motor Controllers

Here is a low-cost and simple wireless stepper motor controller using infrared signals. Using this circuit you can control the stepper motor from a distance of up to four metres [77].



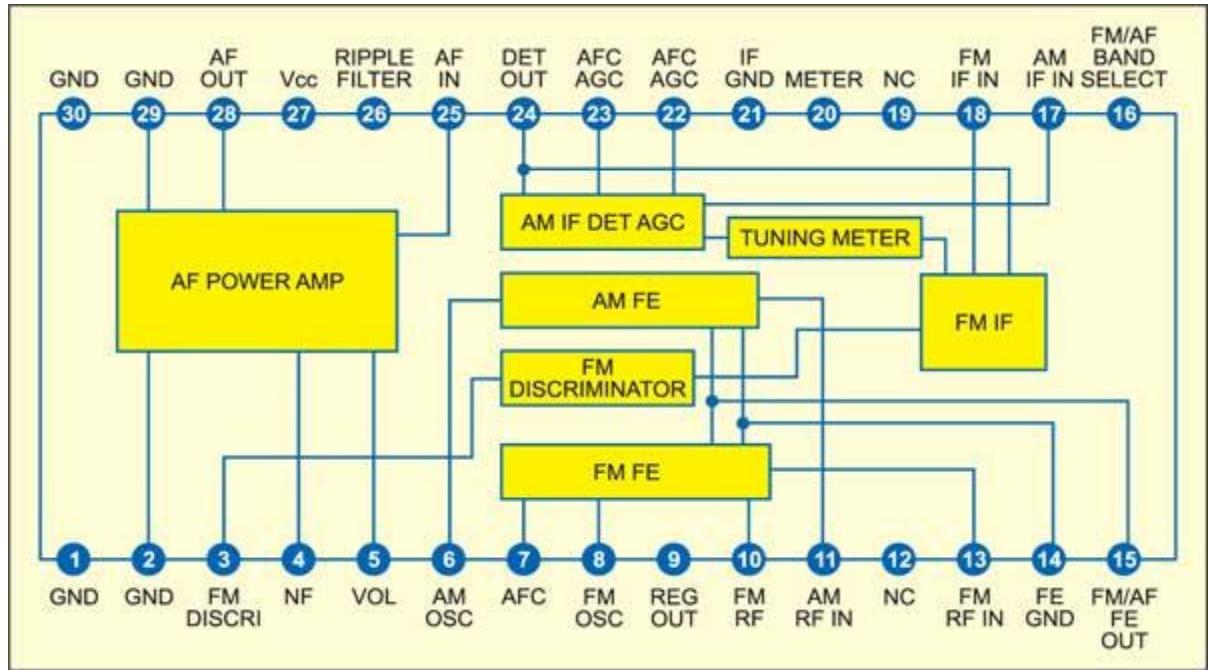
79. Manual EPROM Programmer

The programmer devices required for programming the electrically programmable read only memories (EPROMs) are generally expensive. Here is a low-cost circuit to program binary data into 2716 and 2732 EPROMs [78].



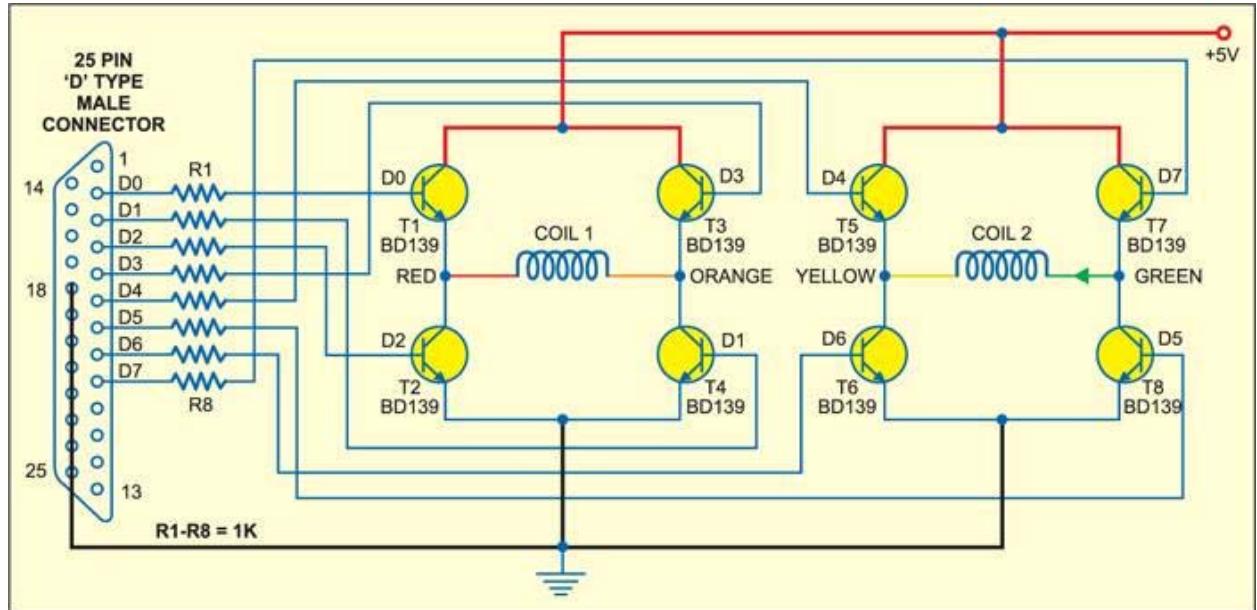
80. Noise-Muting FM Receiver

The tuning of a frequency-modulated (FM) receiver to an FM radio station frequency involves a lot of ‘hissing’ noise in between the stations, which is very irritating for the operator and as such undesirable [79].



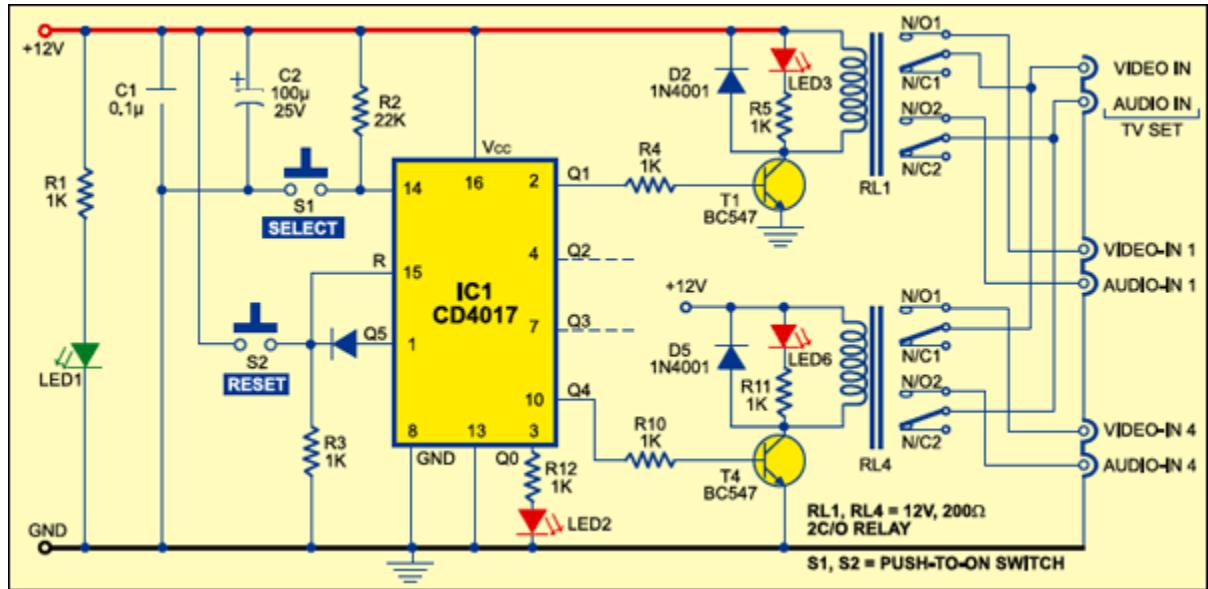
81. PC-Based Stepper Motor Controller

This stepper motor controller is perhaps the cheapest, smallest and simplest. A pair of H-bridges with a software program written in ‘C++’ is used to control the bipolar stepper motor with a step resolution of 18 degree per pulse [80].



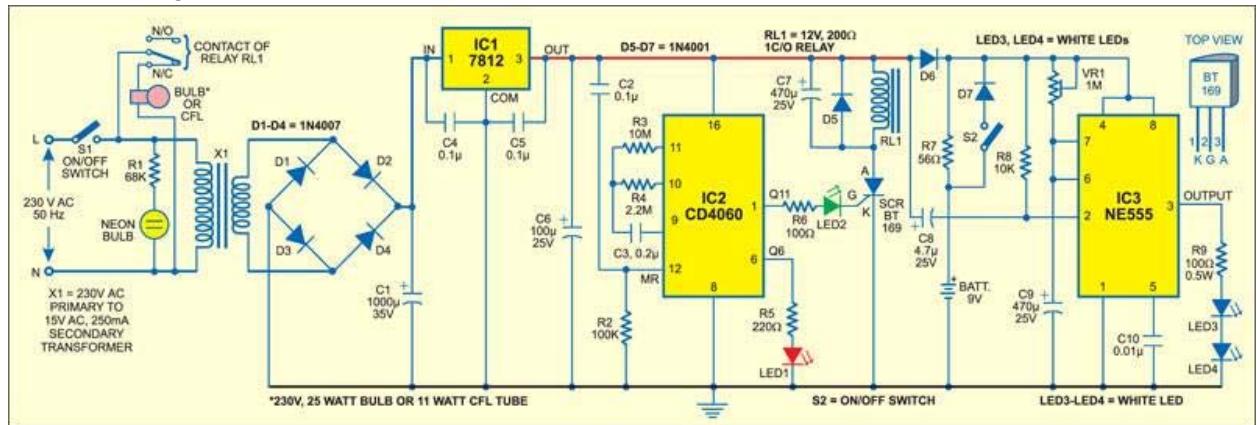
82. DIGITAL AUDIO/ VIDEO INPUT SELECTOR

Need to connect more than one audio-video (AV) source to your colour television? Don't worry, here's an AV input expander for your TV. It is inexpensive and easy to construct [82].



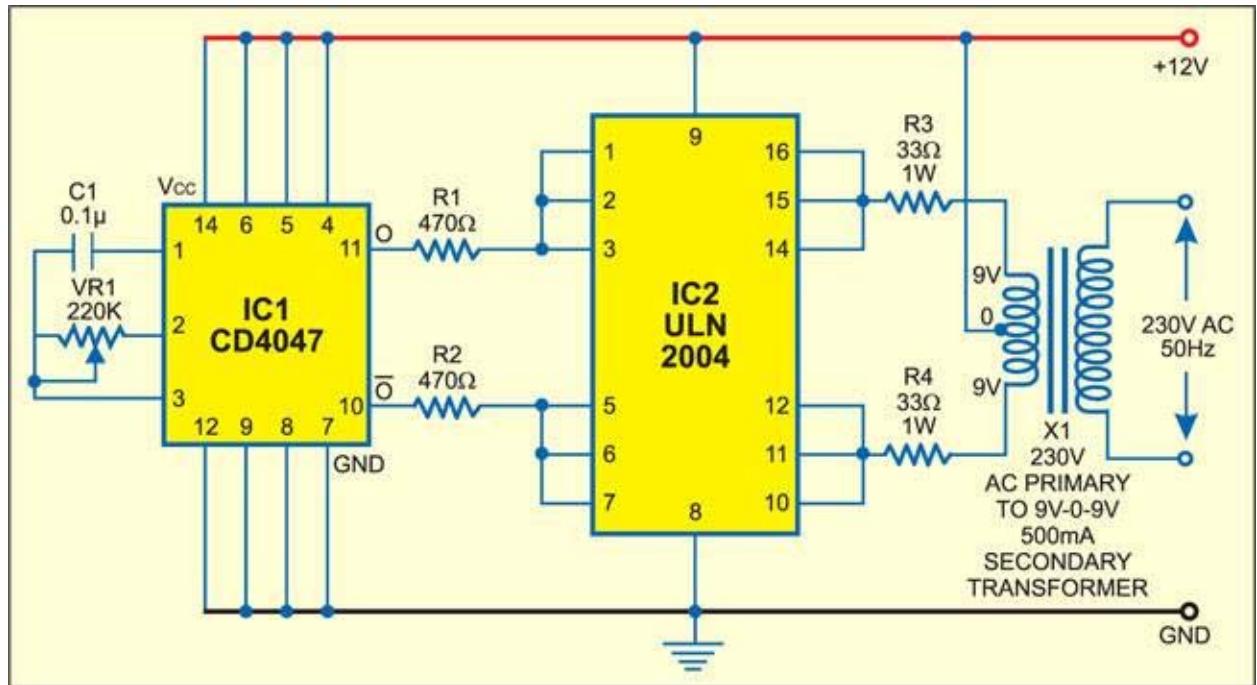
83. Automatic Bathroom Light with Back-up Lamp

Sometimes we forget to switch off the bathroom light and it remains on unnoticed for long periods. This circuit solves the problem of electricity wastage by switching off the lamp automatically after 30 minutes once it is switched on. The back-up LED lamp provided in the circuit turns on for three minutes when mains fails. This is helpful especially when you are taking a shower at night [82].



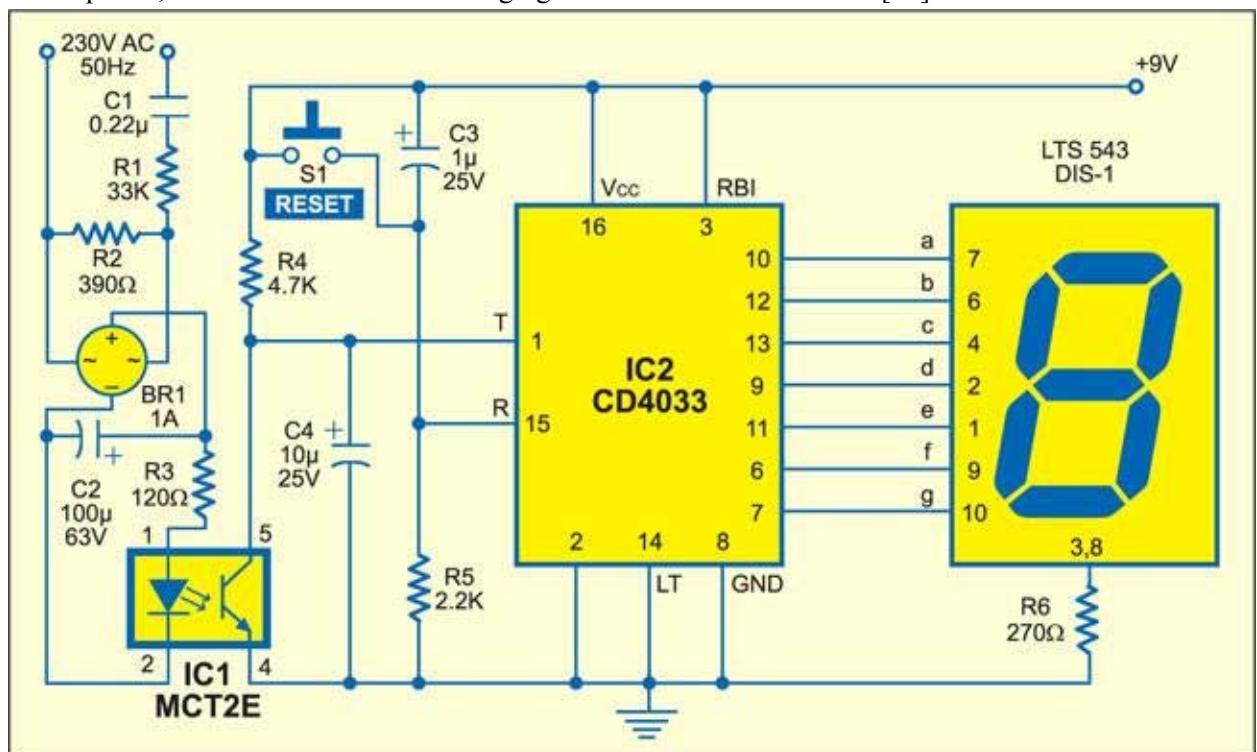
84. Simple Low-Power Inverter

Here is a simple low-power inverter that converts 12V DC into 230-250V AC. It can be used to power very light loads like window chargers and night lamps, or simply give shock to keep the intruders away. The circuit is built around just two ICs, namely, IC CD4047 and IC ULN2004 [83].



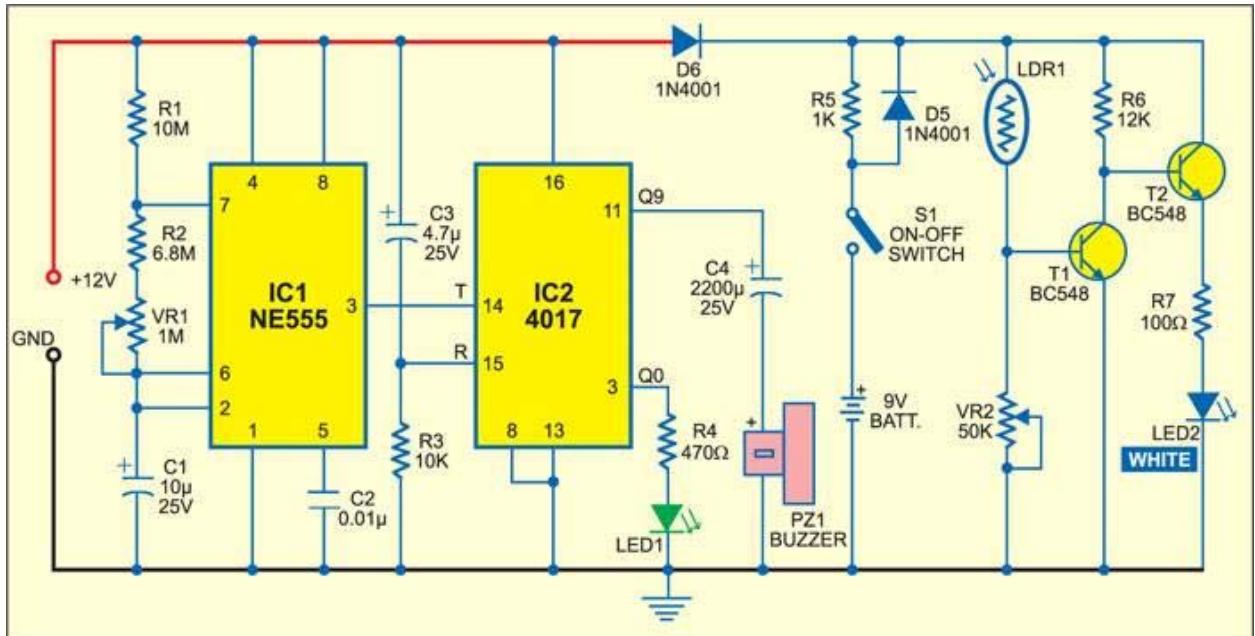
85. Mains Interruption Counter with Indicator

This circuit counts mains supply interruptions (up to 9) and shows the number on a 7-segment display. It is highly useful for automobile battery chargers. Based on the number of mains interruptions, the user can extend the charging time for lead-acid batteries [84].



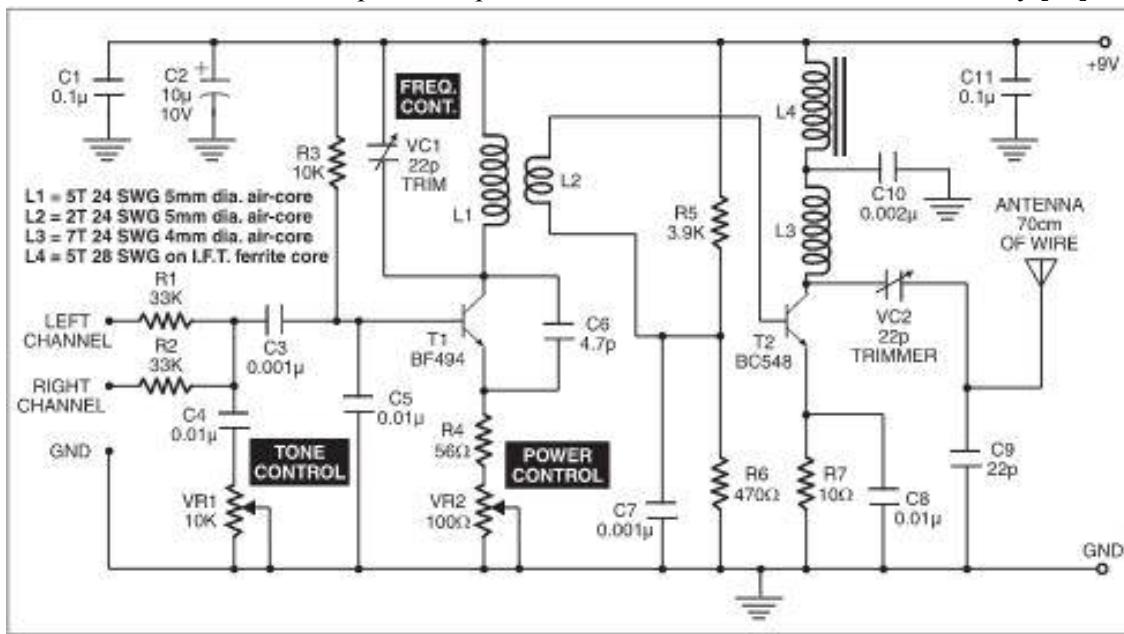
86. Power-on Reminder with LED Lamp

Many a times equipment at workstations remain switched on unnoticed. In this situation, these may get damaged due to overheating. Here is an add-on device for the workbench power supply that reminds you of the power-on status of the connected devices every hour or so by sounding a buzzer for around 20 seconds. It also has a white LED that provides good enough light to locate objects when mains fails [85].



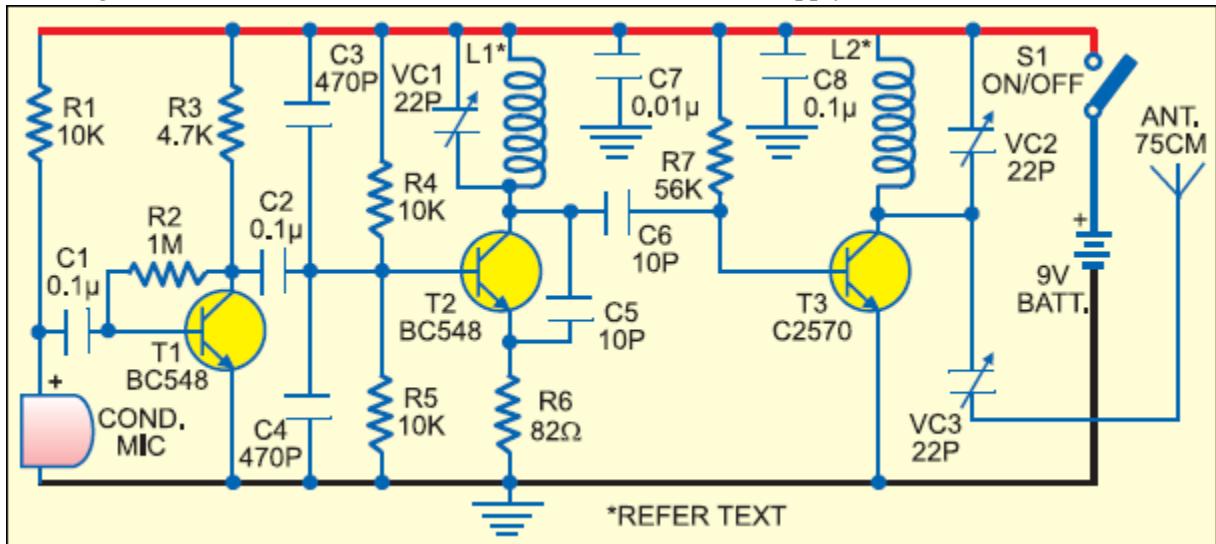
87. QUALITY FM TRANSMITTER

This FM transmitter for your stereo or any other amplifier provides a good signal strength up to a distance of 500 metres with a power output of about 200 mW. It works off a 9V battery [86].



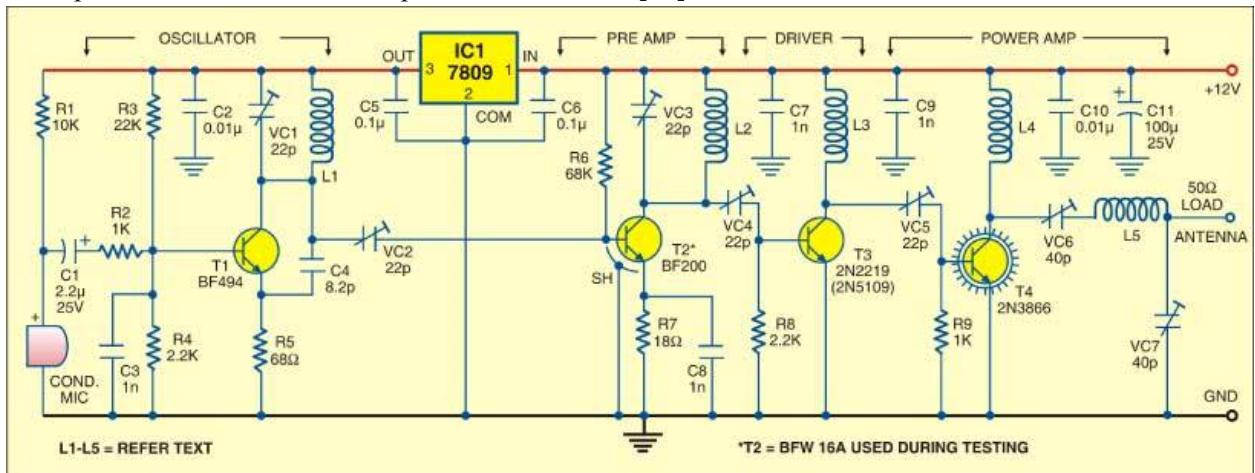
88. MEDIUM-POWER FM TRANSMITTER

The range of this FM transmitter is around 100 metres at 9V DC supply [87].



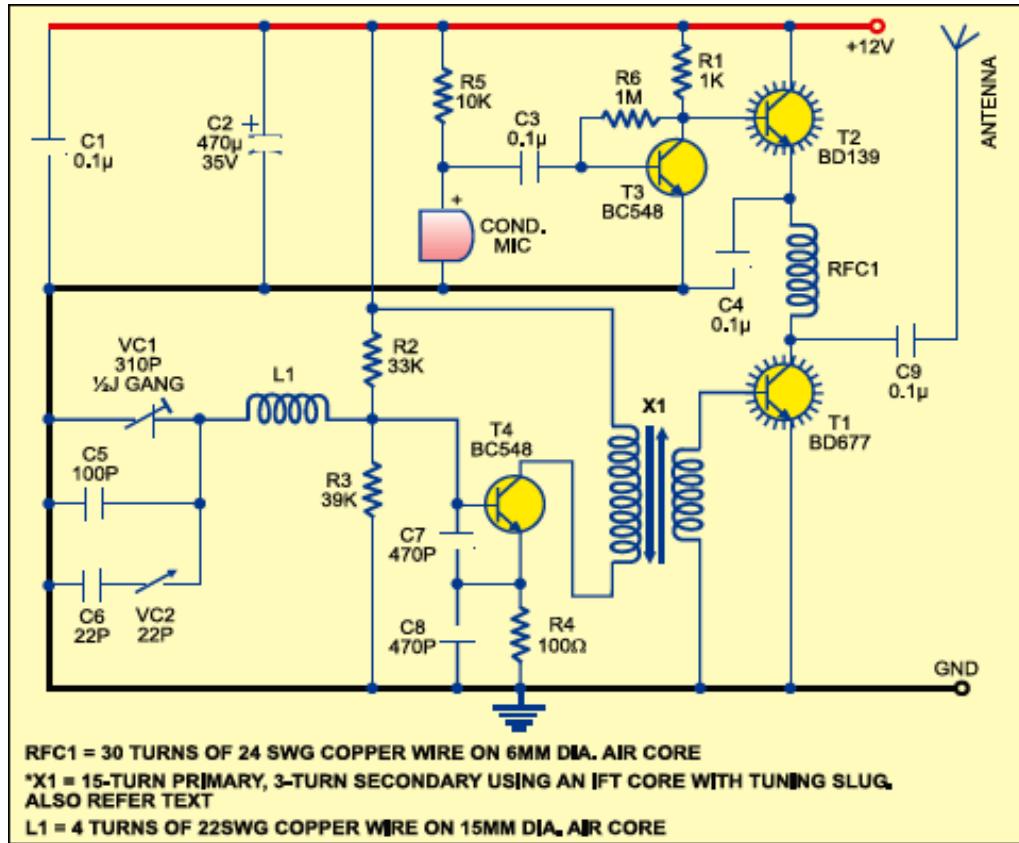
89. FOUR-STAGE FM TRANSMITTER

This FM transmitter circuit uses four radio frequency stages: a VHF oscillator built around transistor BF494 (T1), a preamplifier built around transistor BF200 (T2), a driver built around transistor 2N2219 (T3) and a power amplifier built around transistor 2N3866 (T4). A condenser microphone is connected at the input of the oscillator [88].



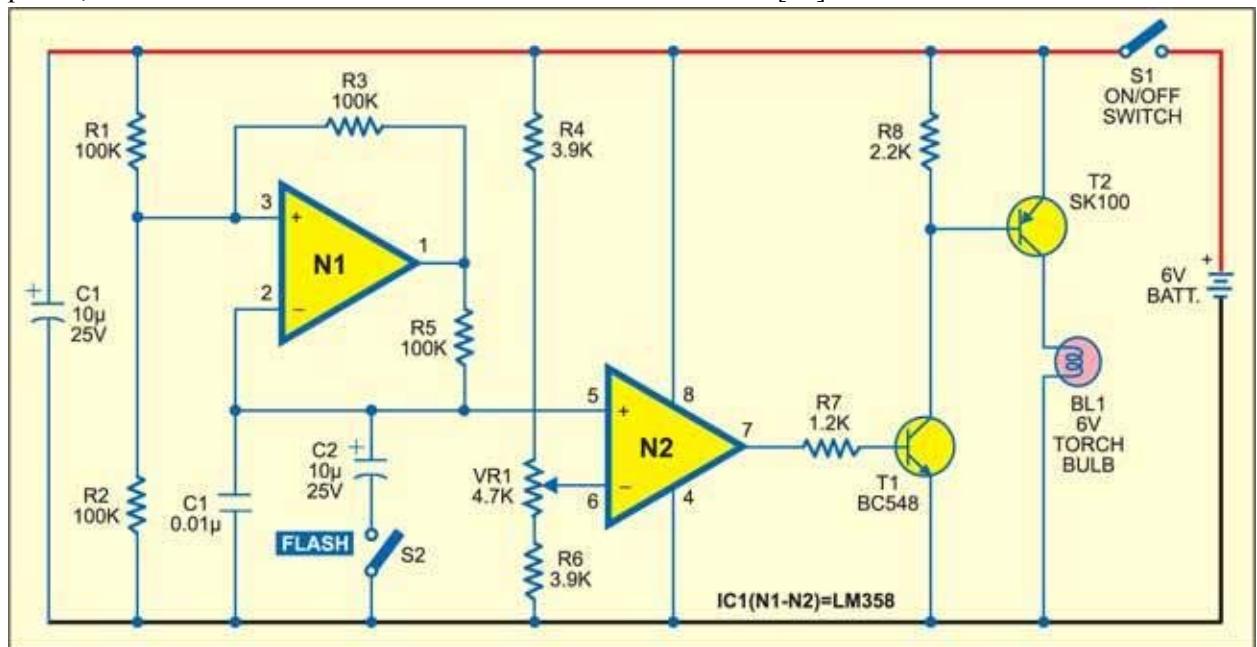
90. SIMPLE SHORT-WAVE TRANSMITTER

This low-cost short-wave transmitter is tunable from 10 to 15 MHz with the help of $\frac{1}{2}$ Jgang condenser VC1, which determines the carrier frequency of the transmitter in conjunction with inductor L1. The frequency trimming can be done with VC2. The carrier is amplified by transistor T4 and coupled to RF amplifier transistor T1 (BD677) through transformer X1* [89].



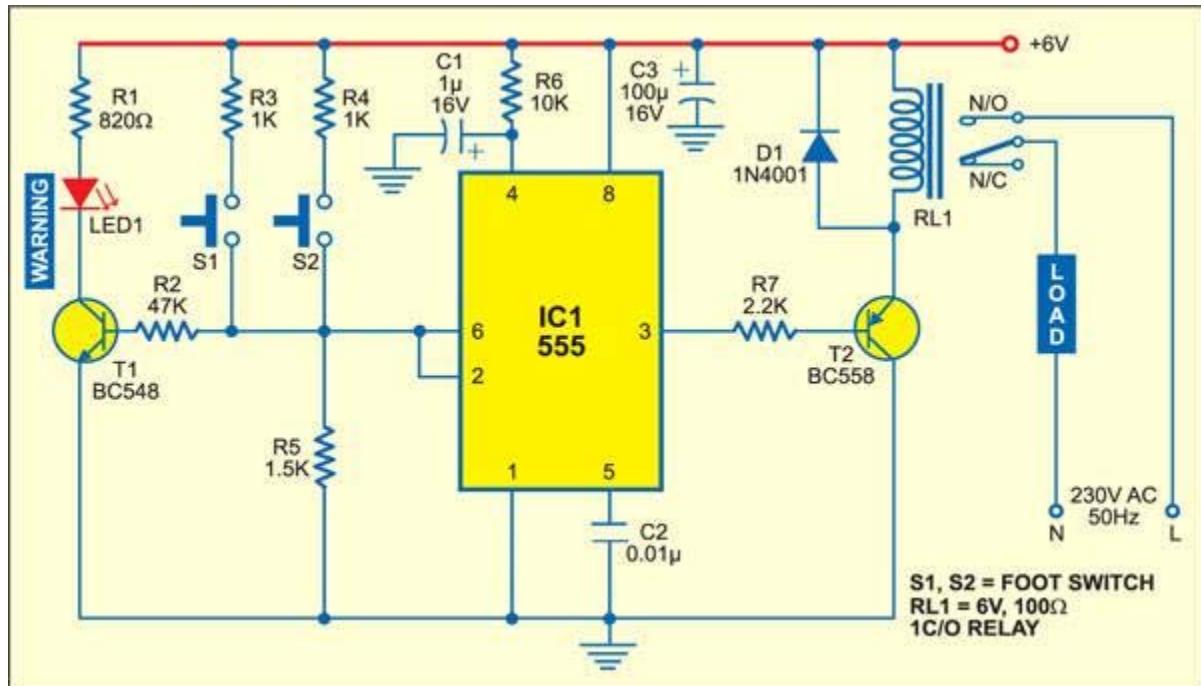
91. Farmhouse Lantern-Cum-Flasher

This circuit uses a dual op-amp IC LM358 and two transistors. It can be powered by a 6V maintenance-free rechargeable battery or a lead-acid accumulator type battery. It has two modes of operation: flasher mode and dimmer mode. The dimmer mode helps conserve the battery power, while in flasher mode the lantern can be used as a beacon [90].



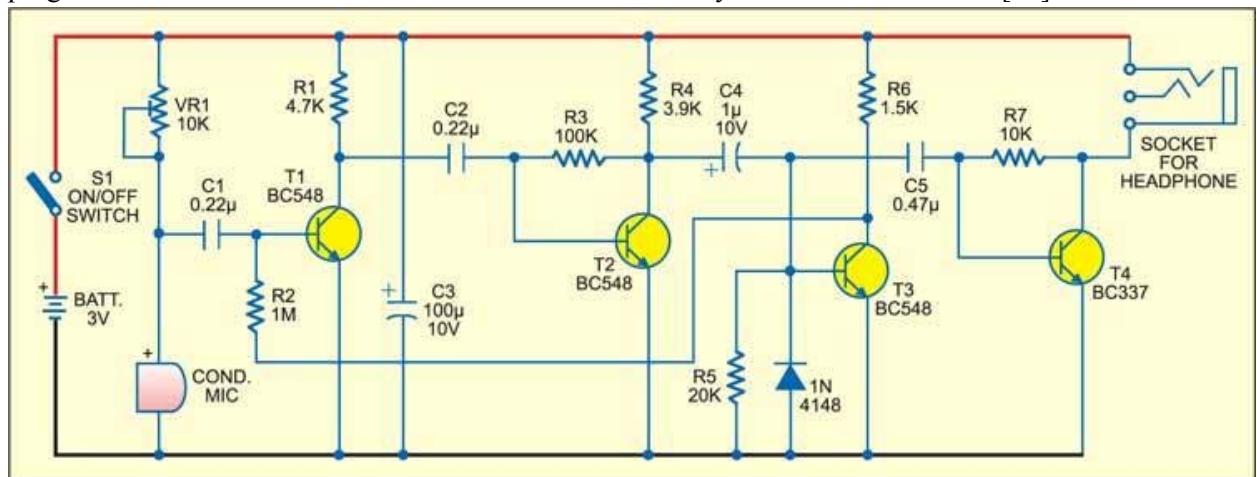
92. Accurate Foot-Switch

Certain industrial controls require accurate switching operations. For example, in case of a foot-switch for precise drilling work, even a small error in switching may cause considerable loss. This low-cost but accurate foot-operated switch can prevent that [91].



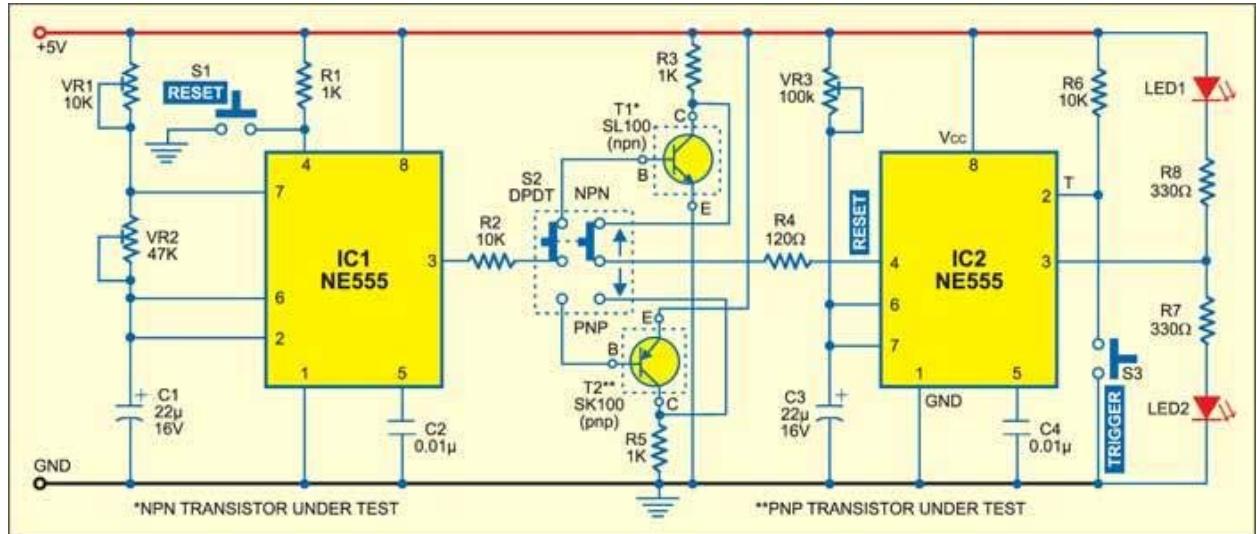
93. Multipurpose Listening Device

This circuit can detect very faint, remote sounds with a good clarity. It is useful in large conference halls, auditoria, cinema halls, lecture rooms in colleges, etc. The circuit can be housed in a small plastic box and kept in a shirt pocket. It is especially useful for watching TV programmes at a low volume so as not to disturb other family members in the house [92].



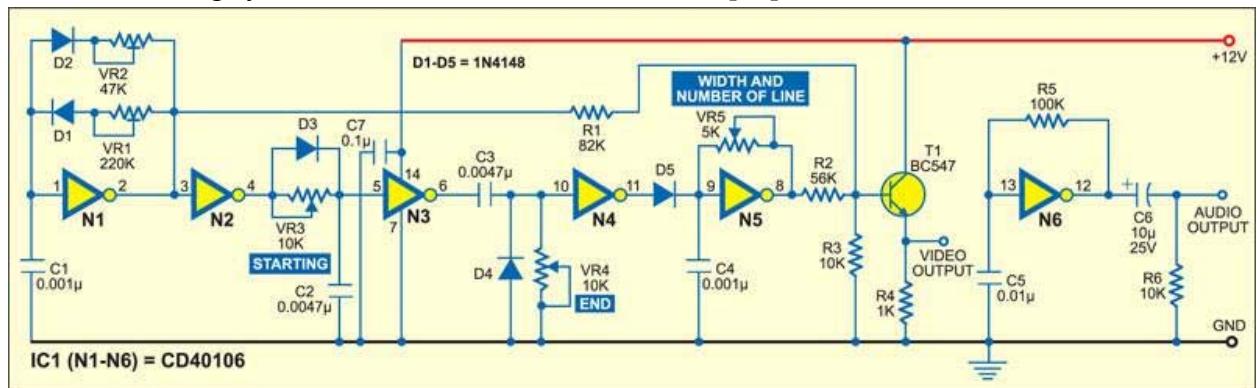
94. Easy Transistor Tester

Using this circuit, find out whether a given transistor is good or bad before soldering it. You can also identify npn and pnp types easily. The tester gives LED indication of the pin-outs as well as the working conditions of the transistors [93].



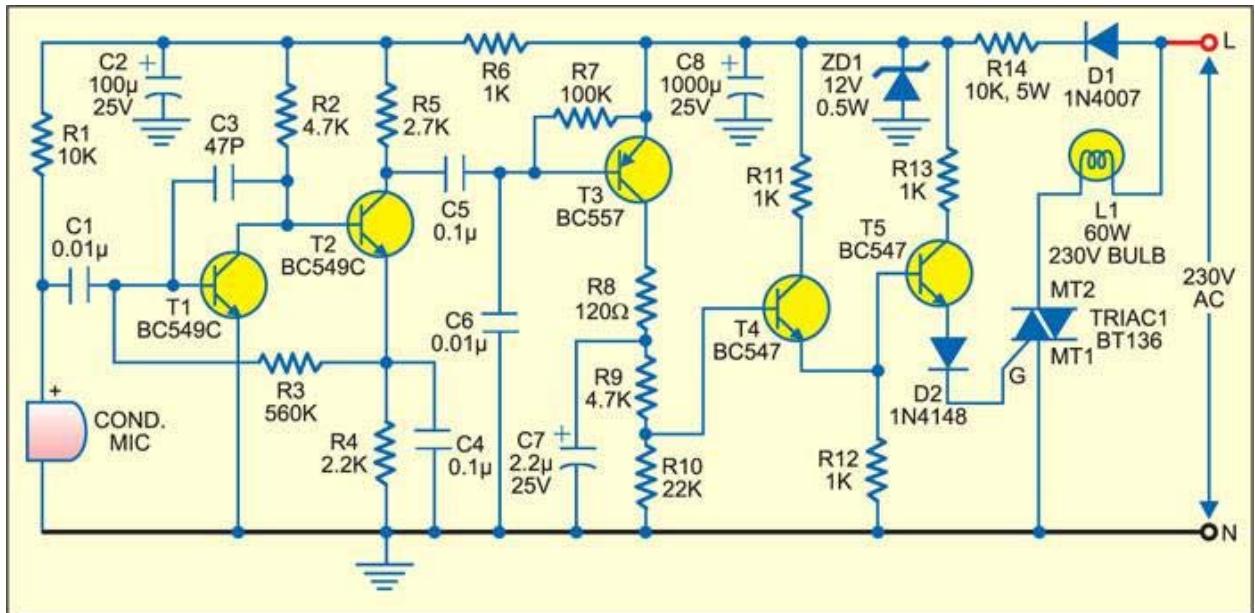
95. TV Pattern Generator

This single-IC TV pattern generator is useful for fault finding in TV sets. You can correct the alignment of the timing circuits of the TV set with the help of this circuit. The vertical stripes (bars) produced by the pattern generator on the TV screen help you align the vertical scanning synchronisation circuit of the receiver [94].



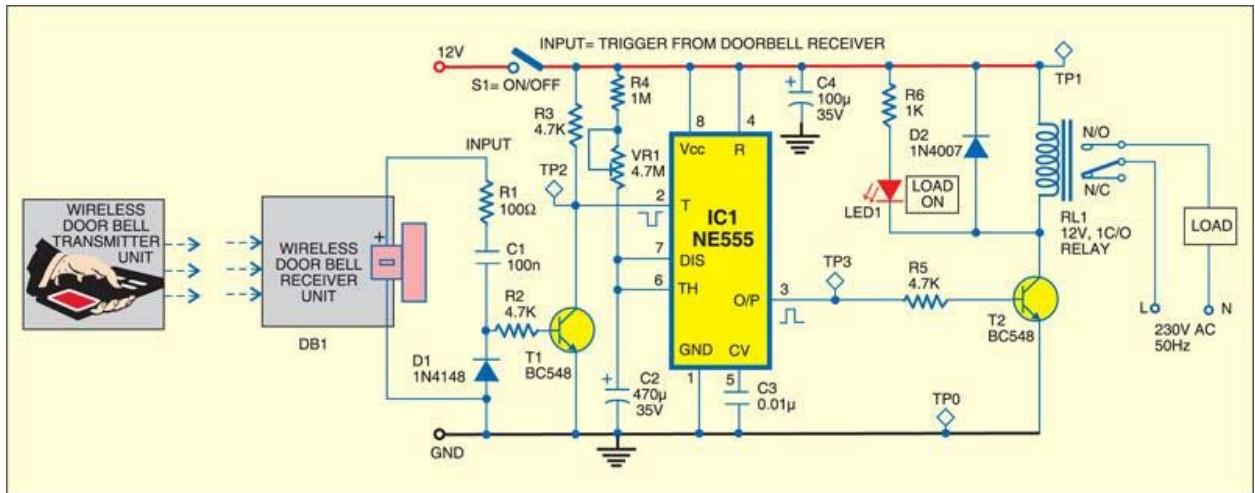
96. Sound-Operated Switch for Lamps

This inexpensive, fully transistorised switch is very sensitive to sound signals and turns on a lamp when you clap within 1.5 metres of the switch. One of its interesting applications is in discotheques, where lights could be turned on or off in sync with the music beats or clapping [95].



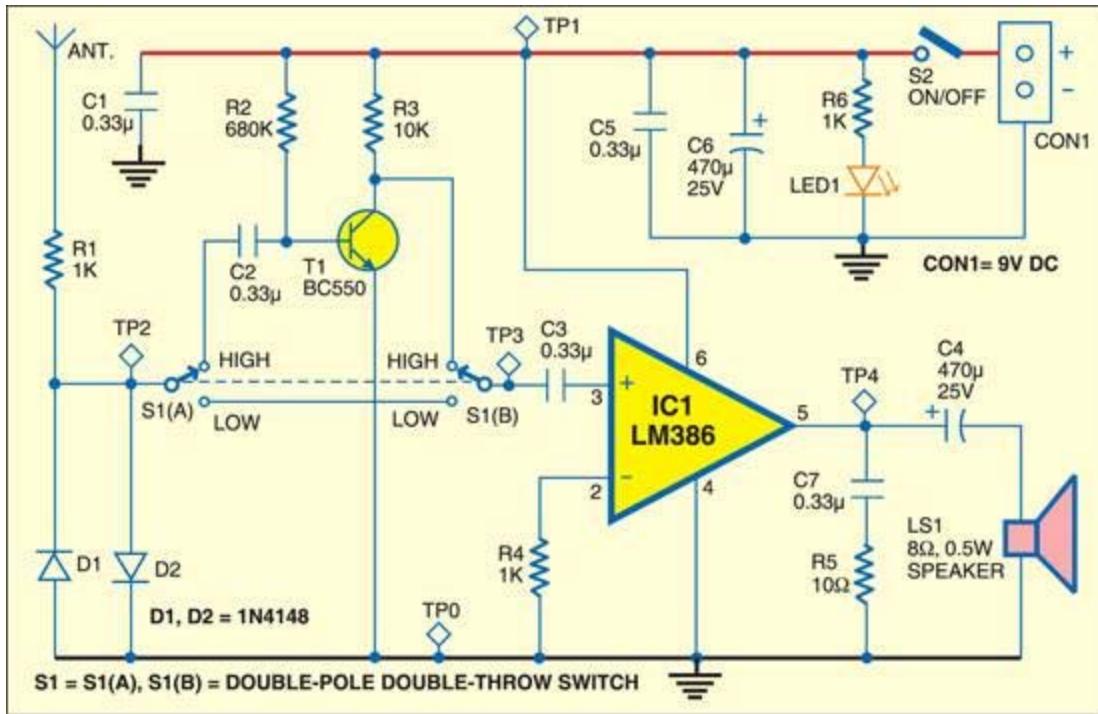
97. Remote Control using Wireless Doorbell

This circuit lets you wirelessly control an appliance from a remote place by using a wireless doorbell. The appliance is triggered by the signal from the transmitter of the wireless doorbell and turns off automatically after the preset time period [96].



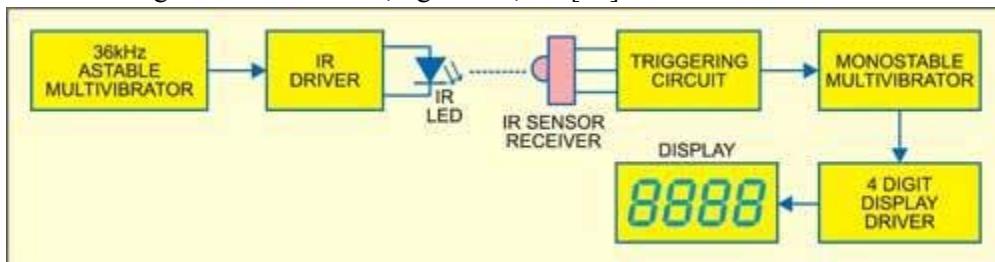
98. RF Signal Detector

This simple circuit can be used to trace the presence of RF signals and electromagnetic noise in your residential area, office or shop. It can be a useful tool while testing or designing RF circuits. It can also be used to detect electrical noise in your premises [97].



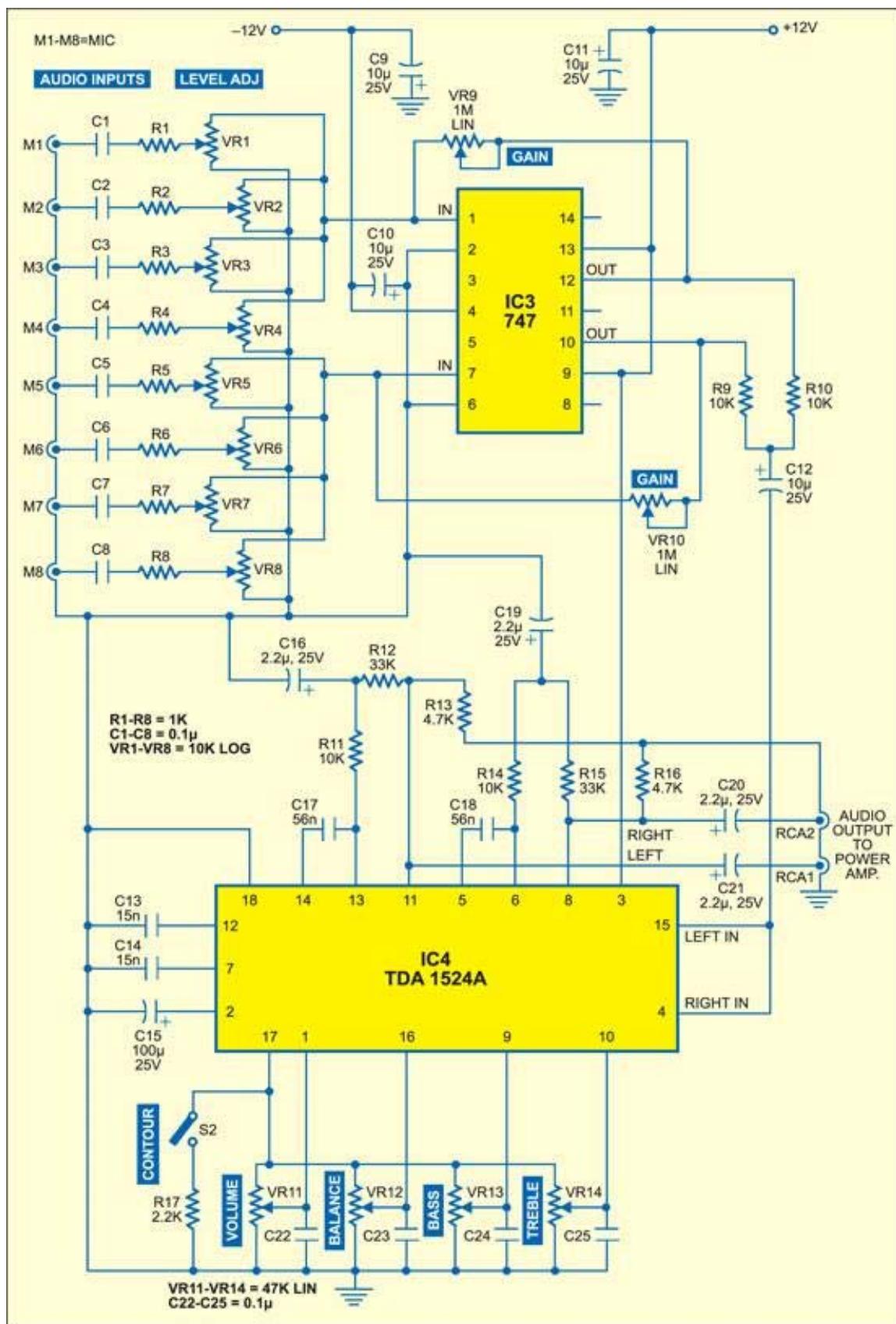
99. Infrared Interruption Counter

Most optical interruption counters make use of a light bulb with light-dependent resistor (LDR) or ordinary phototransistor as the sensor. These interruption counters work satisfactorily in darkness only and cannot be used outdoors because of the chances of false counting due to light sensed from other light sources like sun, light bulb, etc [98].



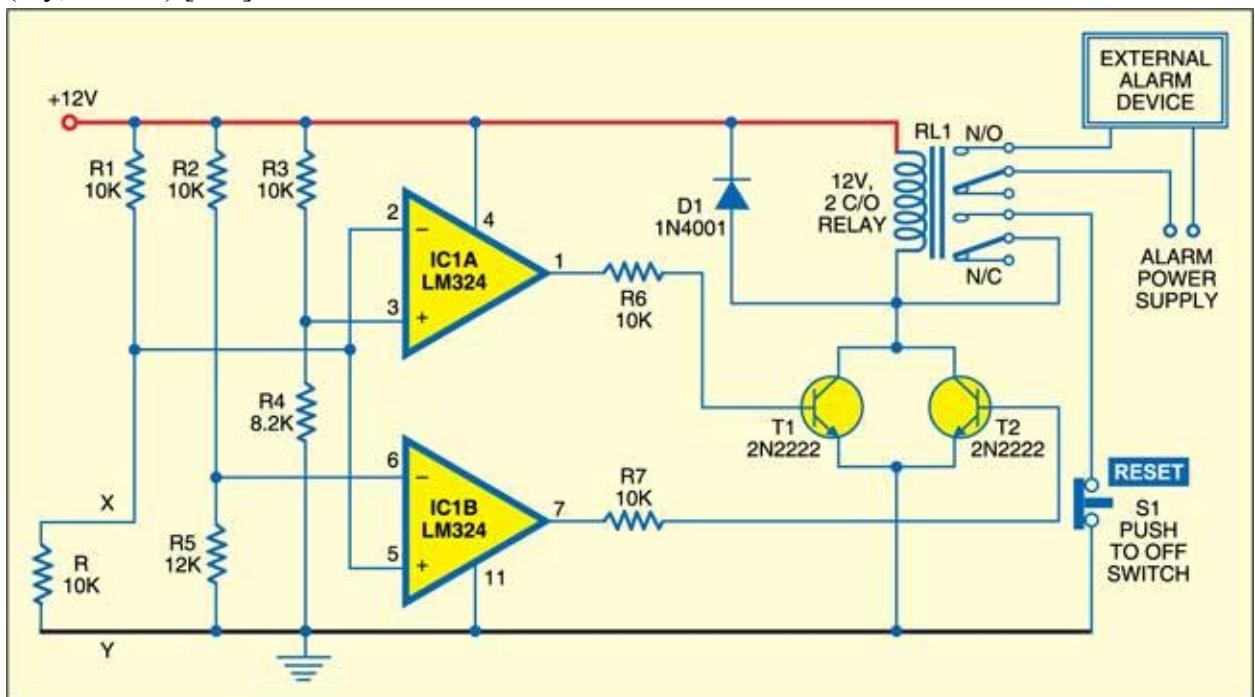
100. Audio Mixer with Multiple Controls

When recording sound from several orchestral instruments being played by different musicians using a single microphone, the only way to adjust the sound balance is to change the position of the musicians relative to the microphone. When recording direct to stereo master tape, it's crucial to make sure that all the voices and instruments sound right before you hit the record button [99].



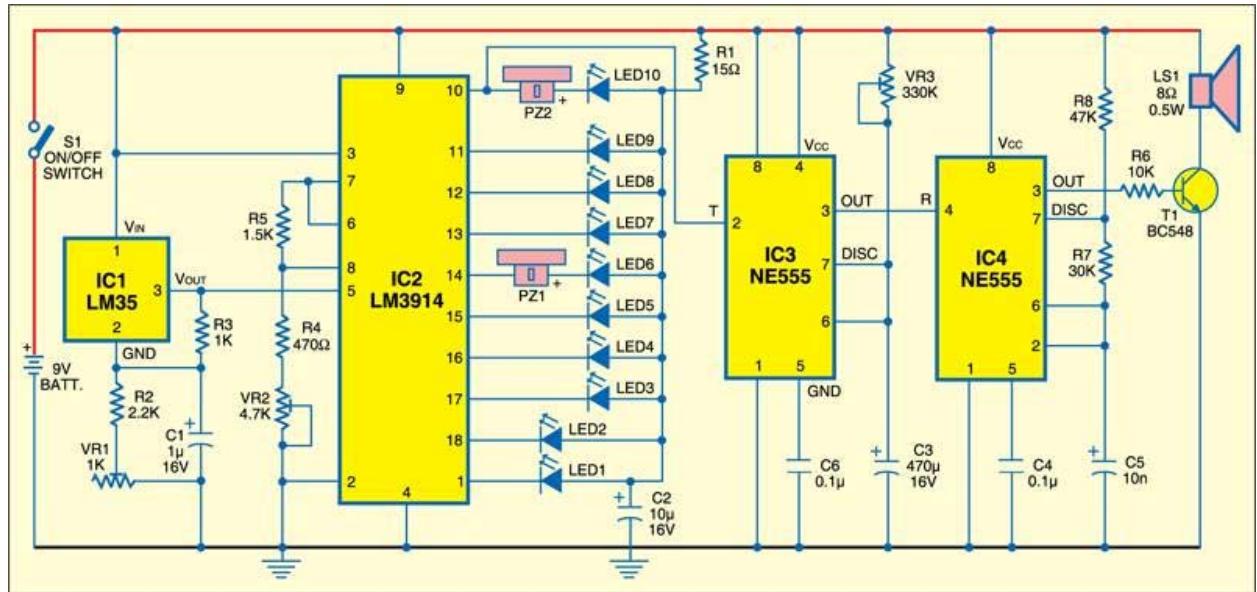
101. Smart Loop Burglar Alarm

Simple loop burglar alarms sound whenever the loop breaks. What if a clever thief comes to know of the working of this alarm? He may simply short the loop by using some other conductor and then cut the shorted portion of the loop without any problem. Here is the circuit of a smart loop burglar alarm that overcomes this drawback by using a sensing resistor (R) in the loop. The sensing resistor has to be kept inside the area to be protected (say, a room) [100].



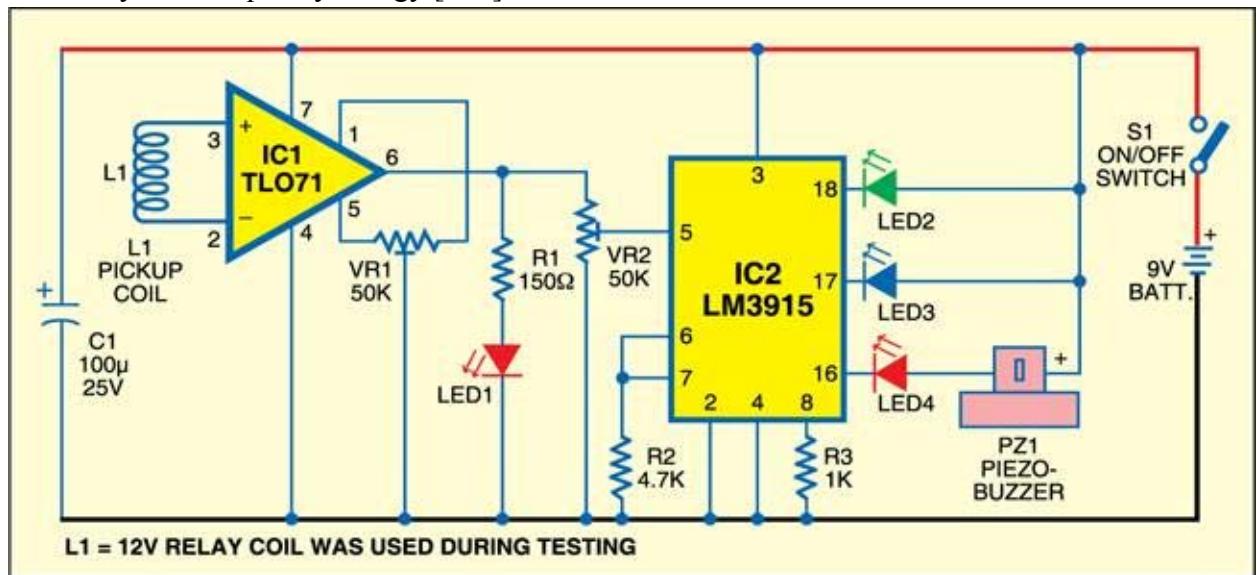
102. Temperature-Tolerance Checking System

Most of instruments and machines used in industries and research laboratories have a temperature-tolerance limit. These can neither be subjected to too high nor too low a temperature for their proper functioning. But they need to function accurately as they are always used in critical applications [101].



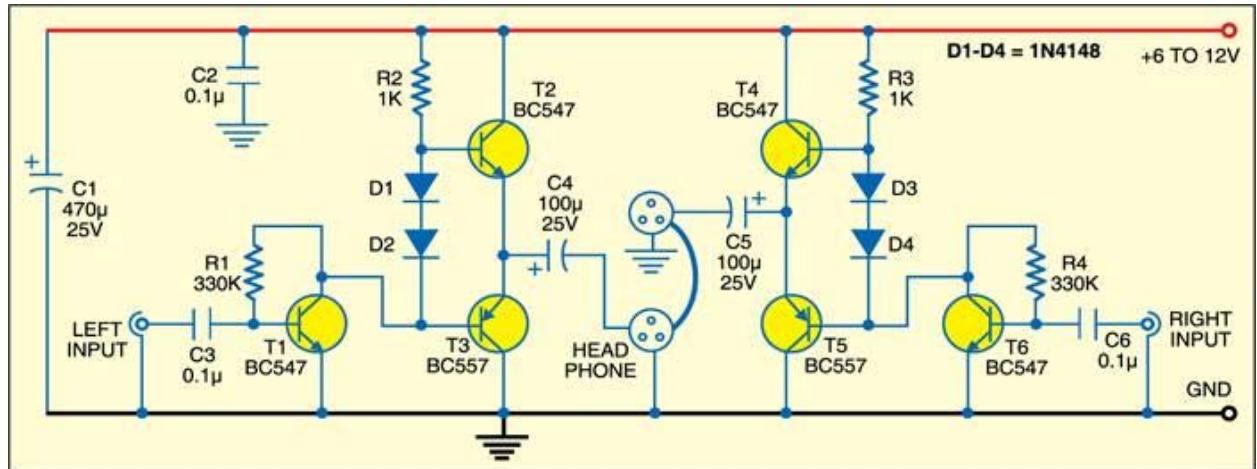
103. Radiation Sensor

When you work on a computer or watch TV, your body is engulfed in an ‘electronic smog’ emanating from the device. For instance, in CRT-based monitors, the spot of electrons that sweep the screen generates pulsed electromagnetic radiation (PEMR). Some of this energy escapes in the form of radiations in very low-frequency and extremely low-frequency energy [102].



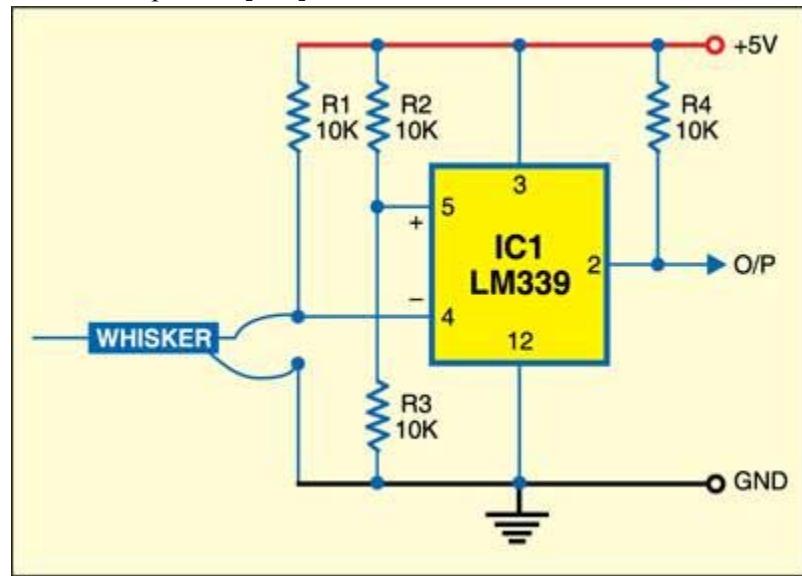
104. Stereo Headphone Amplifier

Here is an inexpensive circuit for a stereo amplifier to drive a low-impedance headphone set. The circuit uses a few cheap transistors (BC547 and BC557) and passive components like resistors, diodes and capacitors. It uses one preamplifier stage and npn-pnp push-pull stage to drive headphone [103].



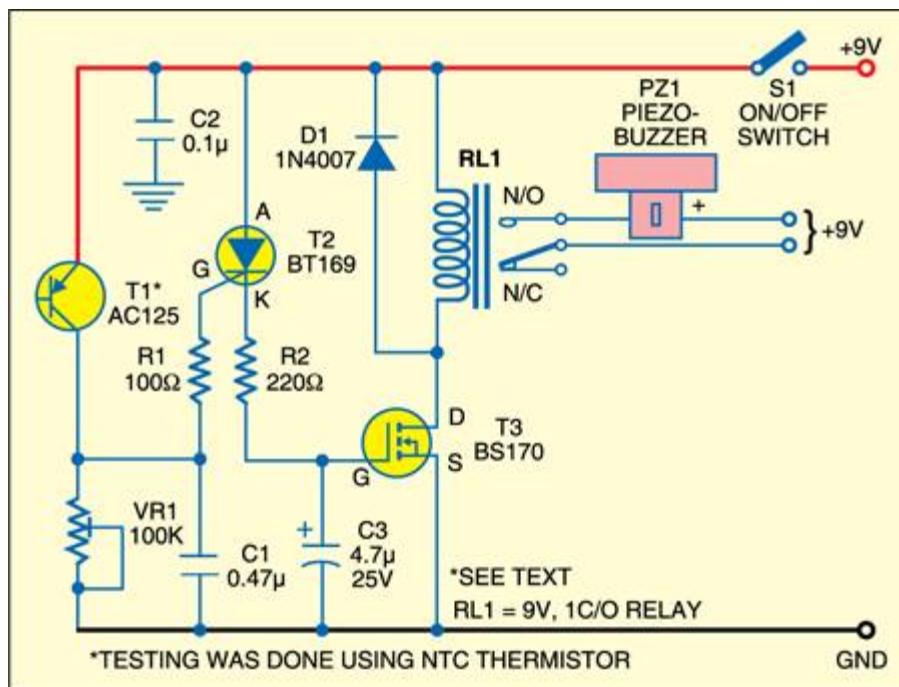
105. Whisker for Robots

Whiskers for robots are simple switch-type sensors that work like an animal's whiskers detecting nearby objects in the environment. When disturbed, the sensor sends a pulse to the robot to indicate that an obstacle is present [104].



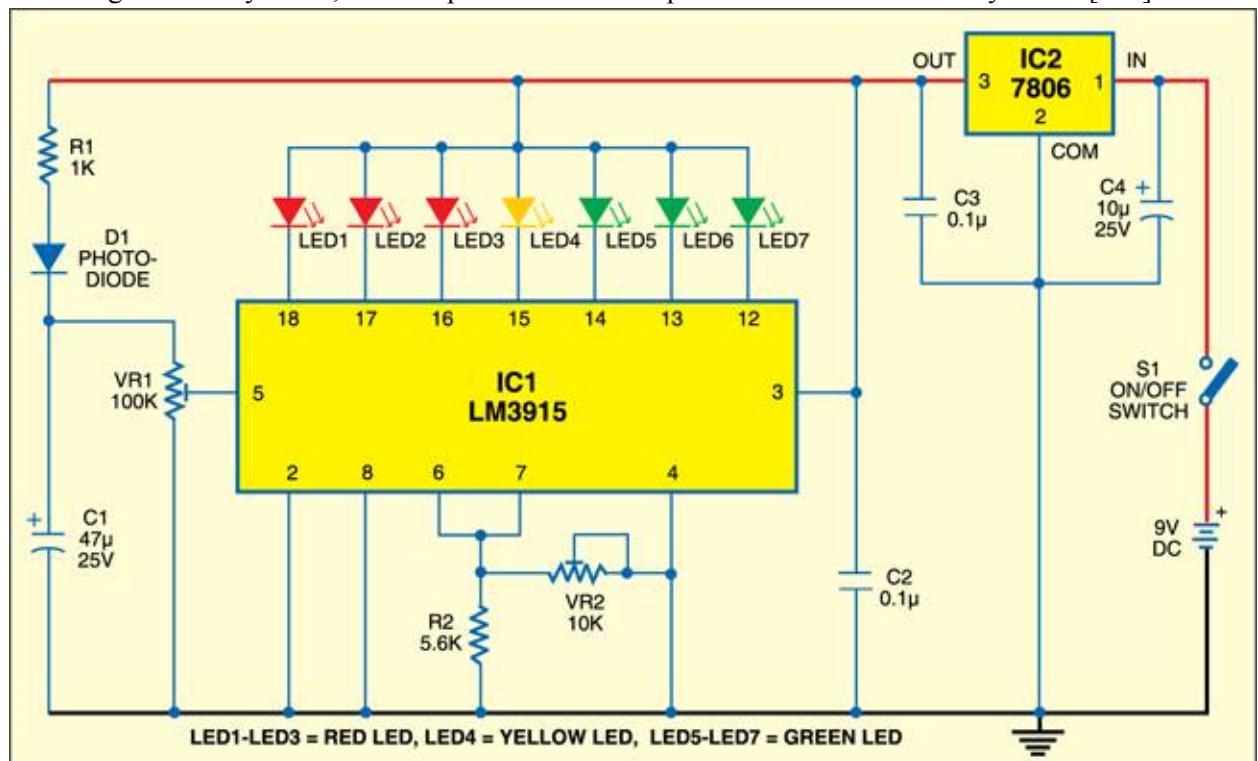
106. Freezer Monitor Alarm

All items stored in a deep freezer will thaw out if, for some reason, the temperature inside the freezer rises to the thaw point. However, a freezer monitor alarm can warn you of the rising temperature before the thaw point is reached [105].



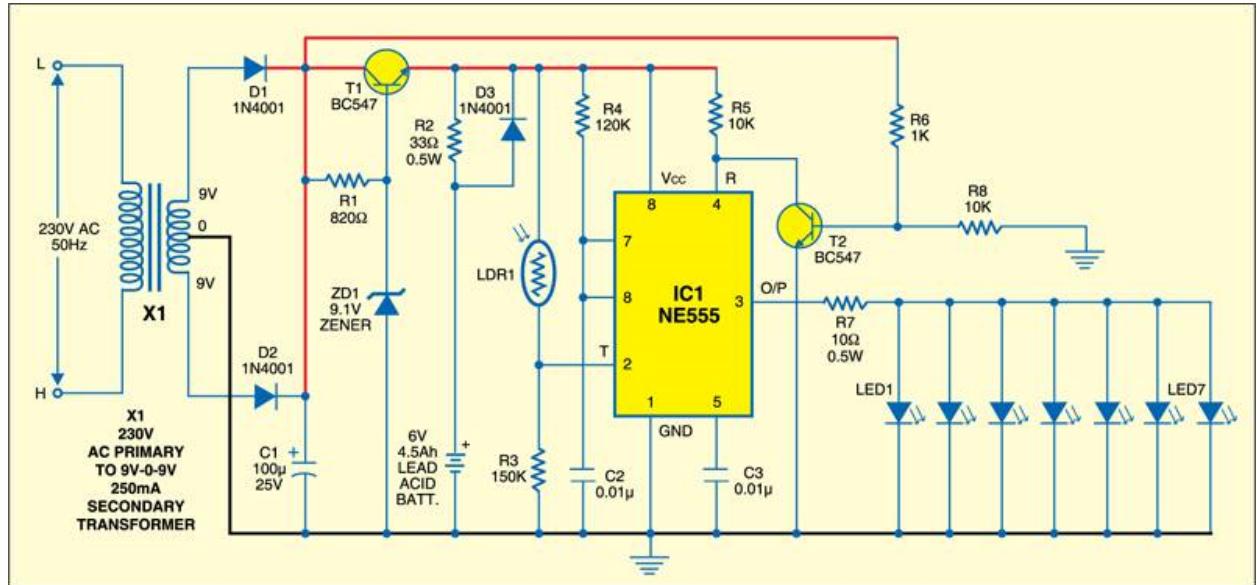
107. Photometer

An illuminance of 100 to 1000 lux is required for reading and doing close work without eye-strain. Specular illumination or bright sunlight provides 50,000 lux, while twilight or dim light provides only 10 lux. Reading and close work under a fluorescent lamp is better because it can give a flux of 4400 lumens in contrast to 1600 lumens of a tungsten lamp. If the eyes are exposed to dim light for many hours, dark adaptation will develop and there will be severe eyestrain [106].



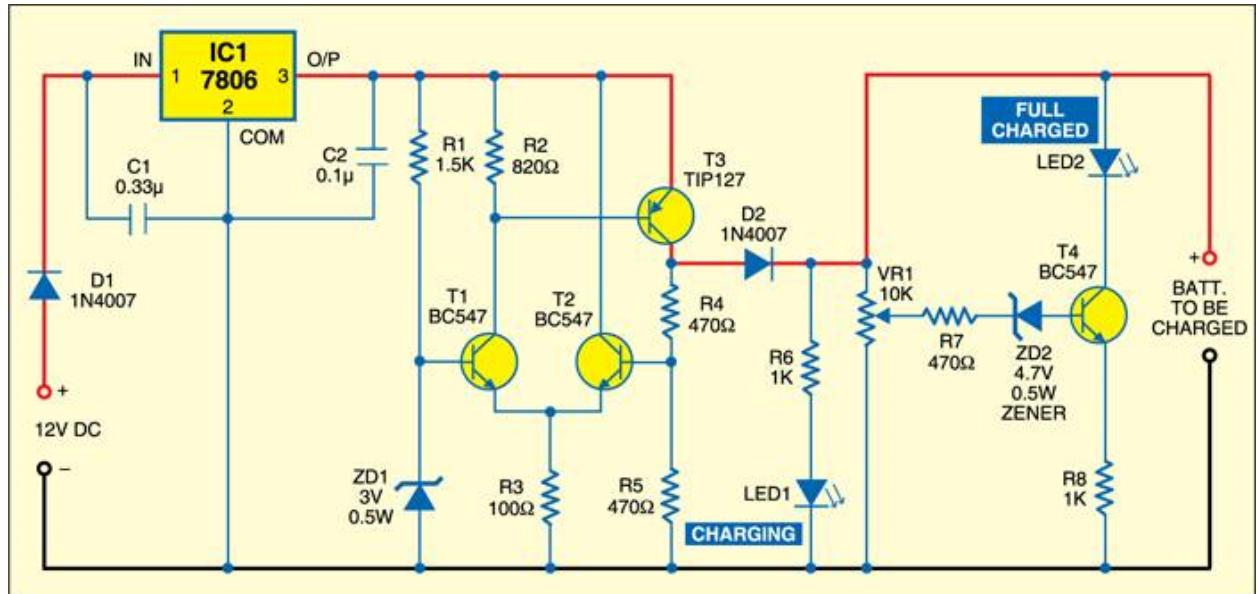
108. Smart Emergency Light

Now you need not fear dark nights when power breaks down. Here's a white LED-based emergency light that automatically turns on when mains power supply fails [107].



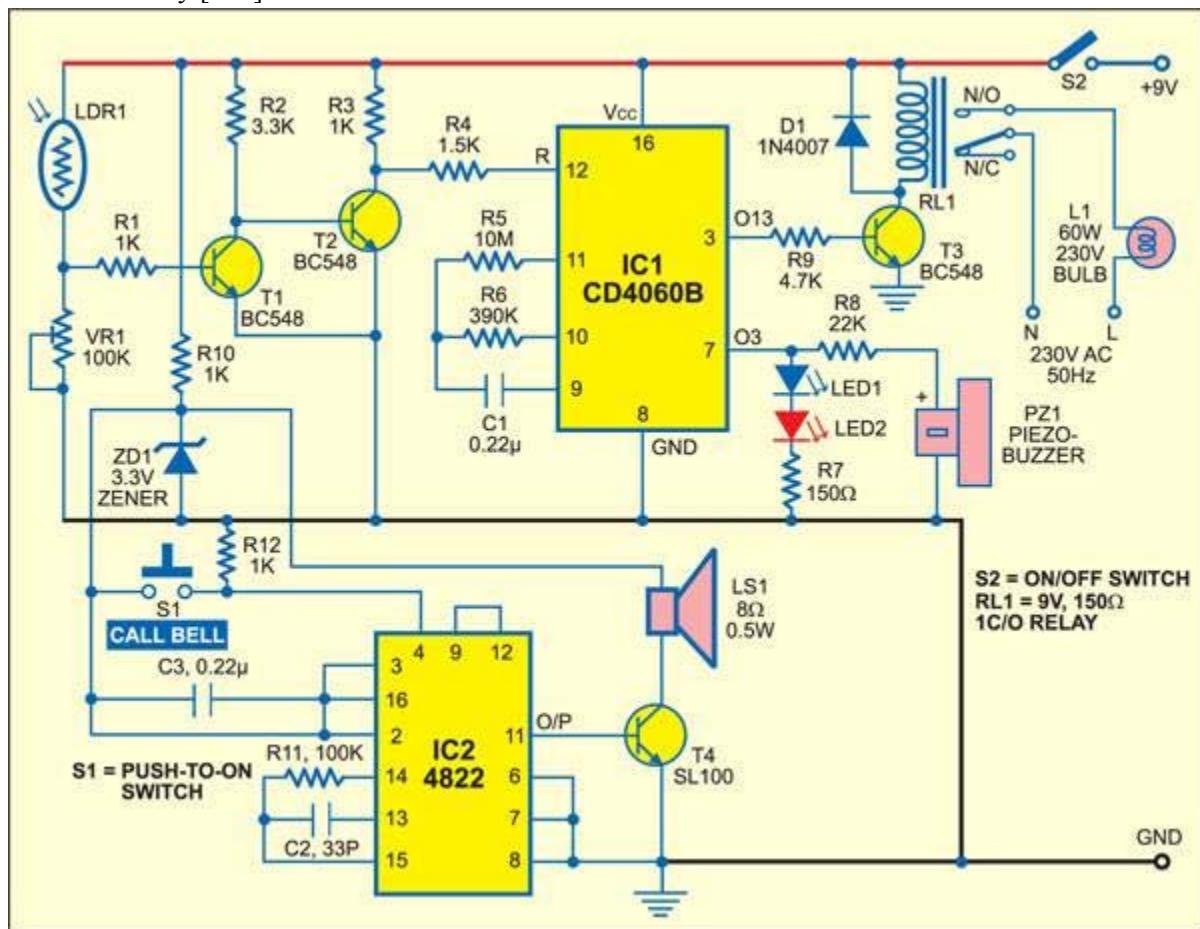
109. Digital Camera Adaptor

You need not be disappointed next time when your digital camera shows low battery indication during a picnic trip. Just plug this digital camera adaptor into the cigarette lighter outlet of your car and connect the camera to it. The adaptor will interface the DC source and the camera battery to provide sufficient charging current to replenish the battery in one hour. The Lithium ion or NiMH battery of the digital camera can be quickly charged with a nominal voltage of 5V and 300mA to 1A current [108].



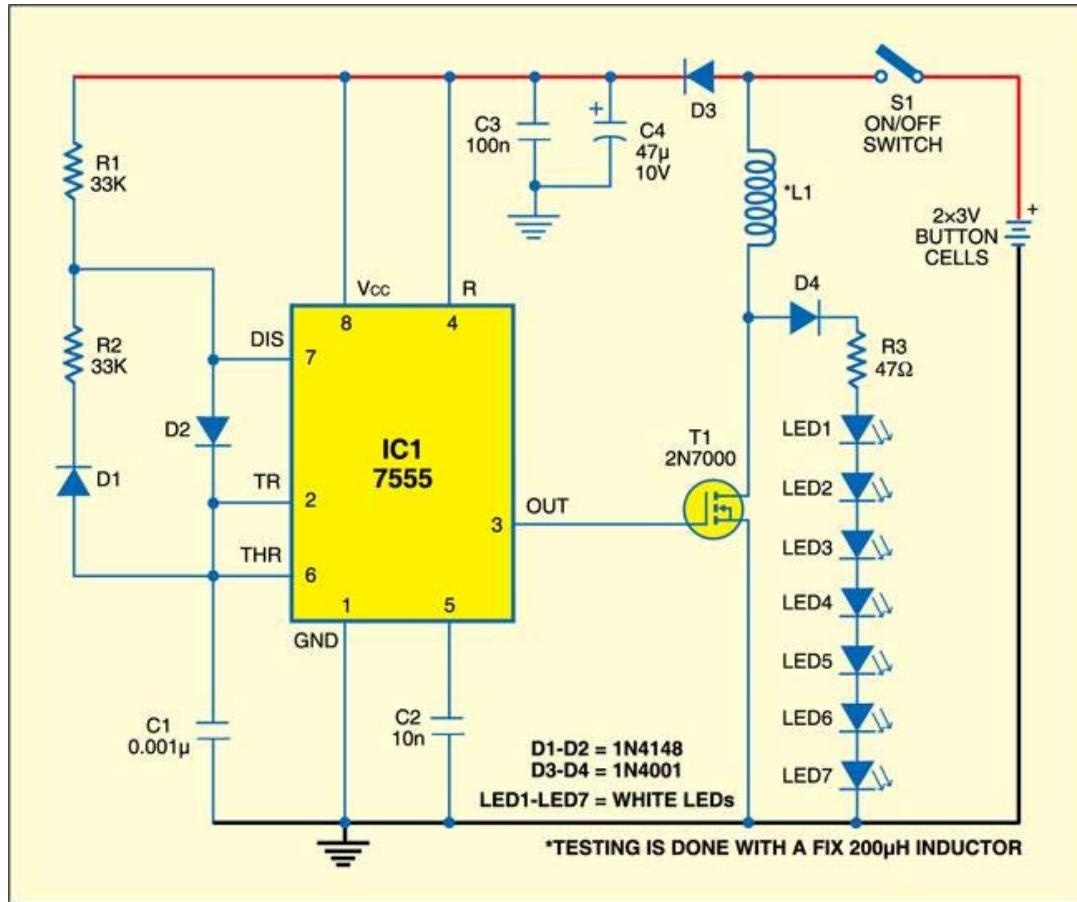
110. Mock Alarm with Call Bell

Here is a fully automatic mock alarm to ward off any intruder to your house. The alarm becomes active at sunset and remains ‘on’ till morning. The flashing light-emitting diodes (LEDs) and beeps from the unit simulate the functioning of a sophisticated alarm system. Besides, the circuit turns on and off a lamp regularly at an interval of 30 minutes throughout the night. It also has a call bell facility [109].



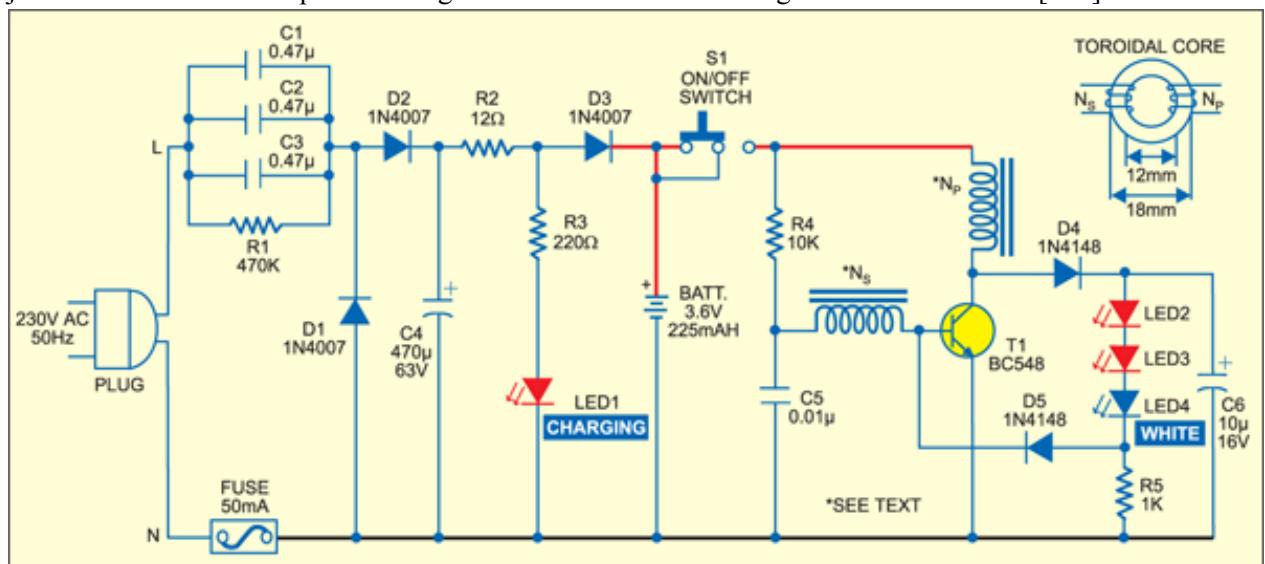
111. Pocket-Size Reading Lamp

This mini reading light combines the advantages of lithium button cells and white LEDs. While white LEDs are super-bright, lithium cells are small in size and last long [110].



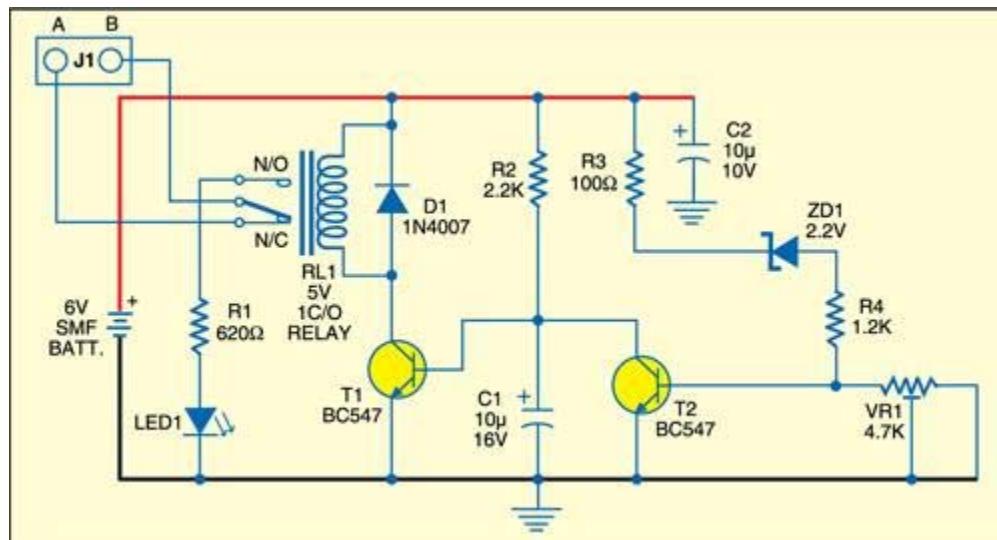
112. Rechargeable Torch Based on White LED

Rechargeable torches don't come without problems. You need to replace the bulbs and charge the batteries frequently. The average incandescent light-emitting diode (LED) based torch, for instance, consumes around 2 watts. Here's a rechargeable white LED-based torch that consumes just 300 mW and has 60 per cent longer service life than an average incandescent torch [111].



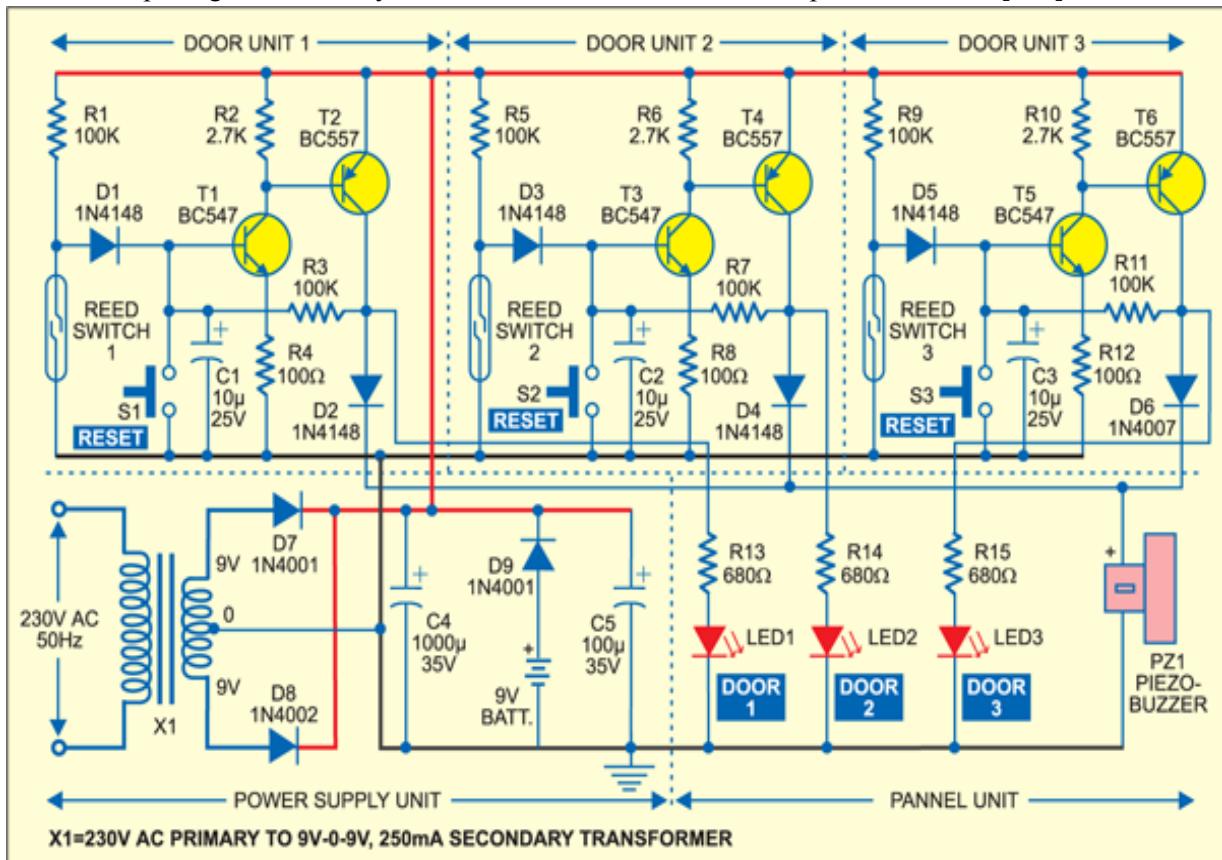
113. SMF Battery Guard

The emergency light is an automatic system in which a rechargeable battery-operated light source turns on as soon as the mains power fails. When the mains supply resumes, the lamp turns off [112].



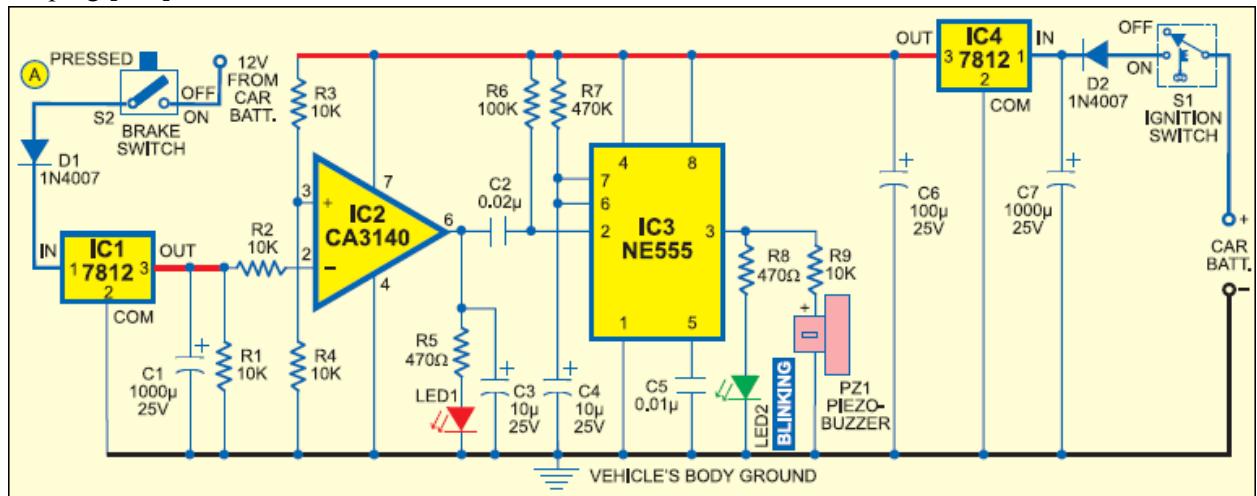
114. Multidoor Opening Alarm with Indicator

This door-opening alarm alerts you of intruders. You can use it for up to three doors [113].



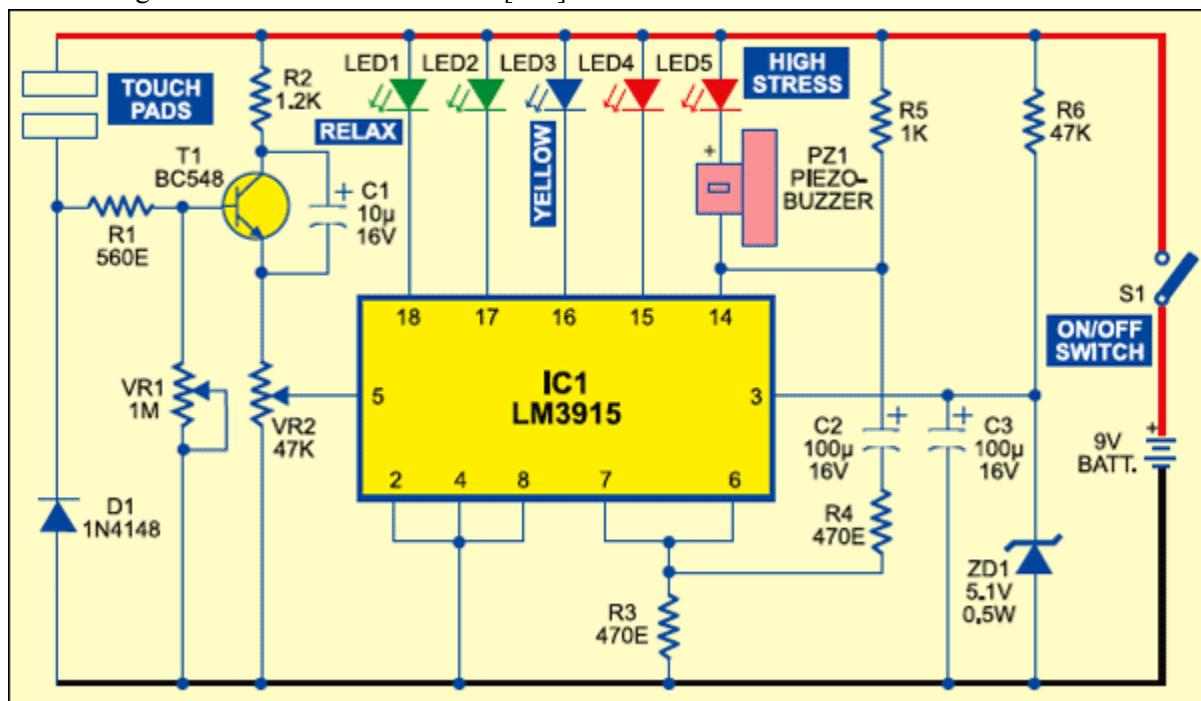
115. BRAKE FAILURE INDICATOR

Do you want to get an early warning of brake failure while driving? Here is a brake failure indicator circuit that constantly monitors the condition of the brake and gives an audio-visual indication. When the brake is applied, the green LED blinks and the piezobuzzer beeps for around one second if the brake system is intact. If the brake fails, the red LED glows and the buzzer stops beeping [114].



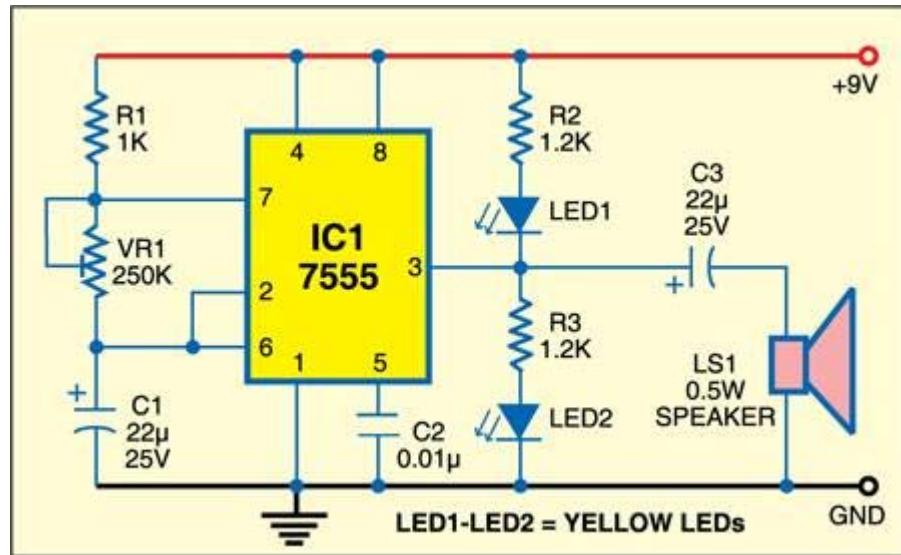
116. STRESS METER

This stress monitor lets you assess your emotional pain. If the stress is very high, it gives visual indication through a light-emitting diode (LED) display along with a warning beep. The gadget is small enough to be worn around the wrist [115].



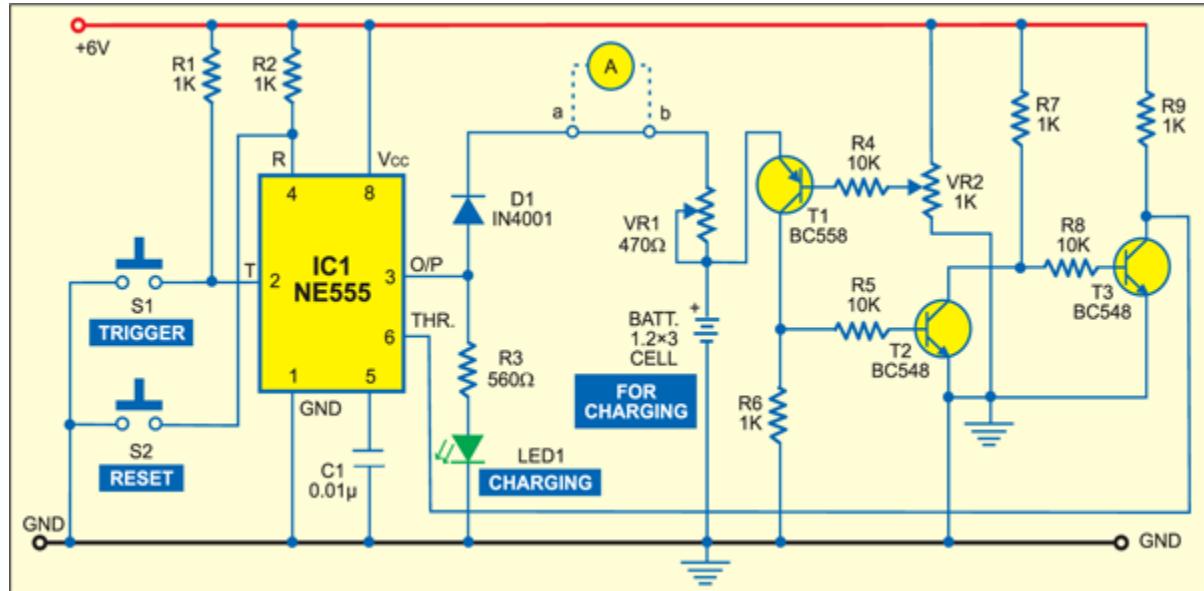
117. Clock Tick-Tock Sound Generator & LED Pendulum

Wooden-case, battery-operated wall clocks with pendulums are available in the market. Some even have chimes. What is missing is the tick-tock sound of old mechanical pendulum clocks [116].



118. Battery Charger with Automatic Switch-off

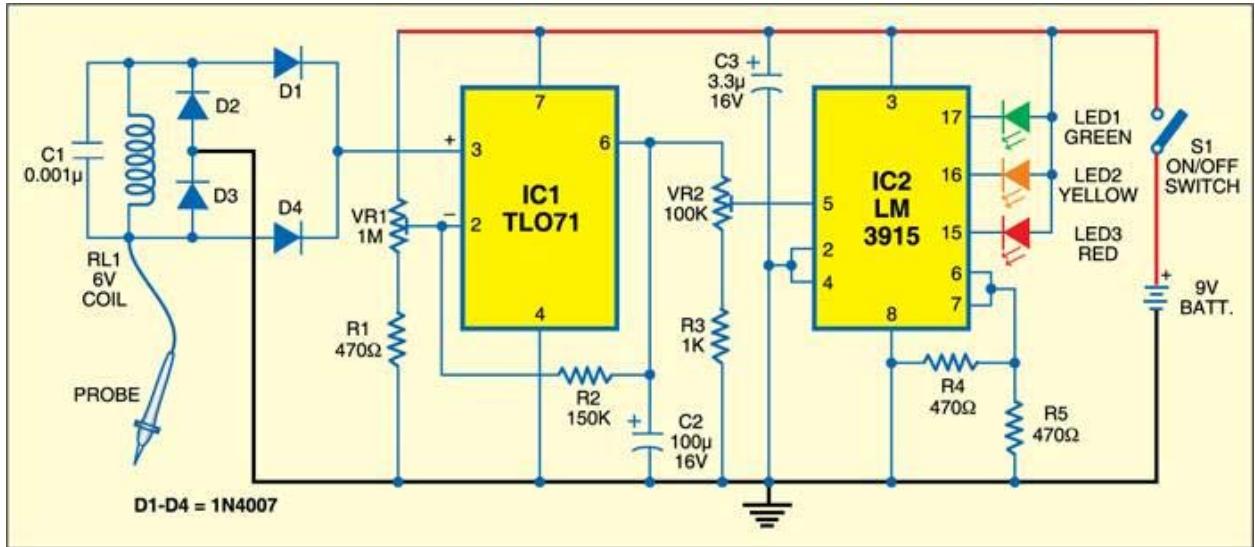
This smart charger automatically switches off when your rechargeable batteries reach the full charge [117].



119. Earth Leakage Tester

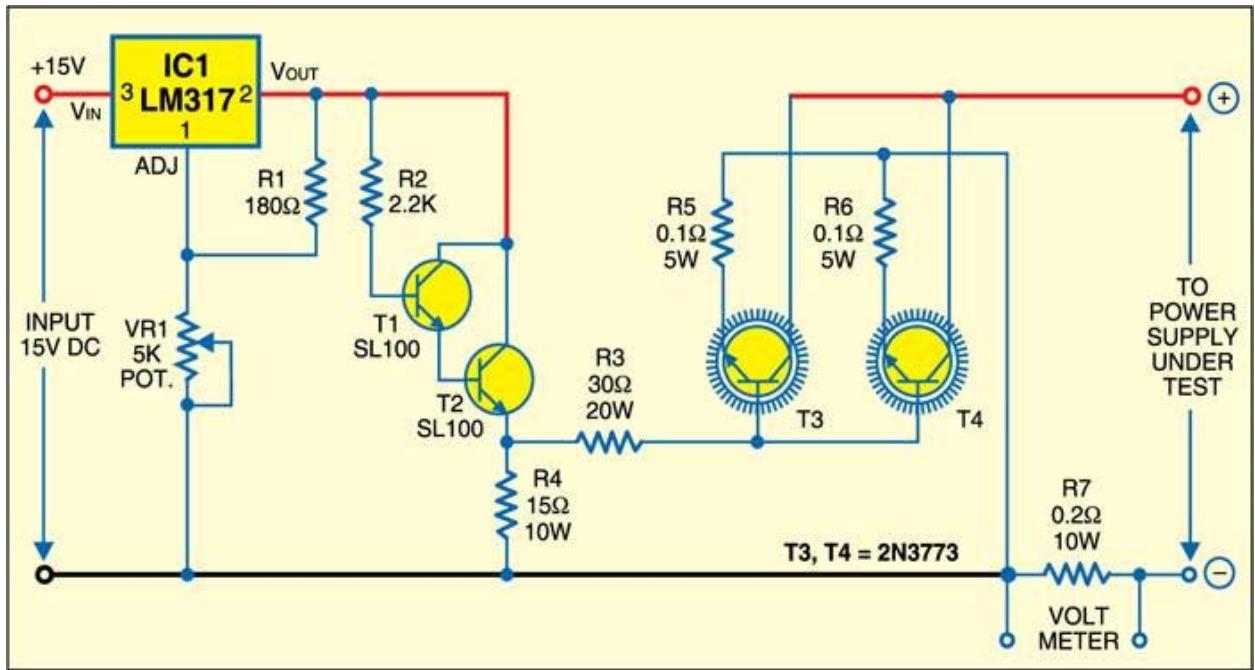
Earth leakage from electrical wiring is a serious problem, especially during rainy season. Pipelines are more vulnerable to earth leakage and may cause an unexpected electric shock. Electrical appliances or faulty wiring may be the source of leakage current through the wet wall

to the earth. An ordinary AC tester cannot detect the earth leakage if current is not high enough to switch on a neon lamp [118].



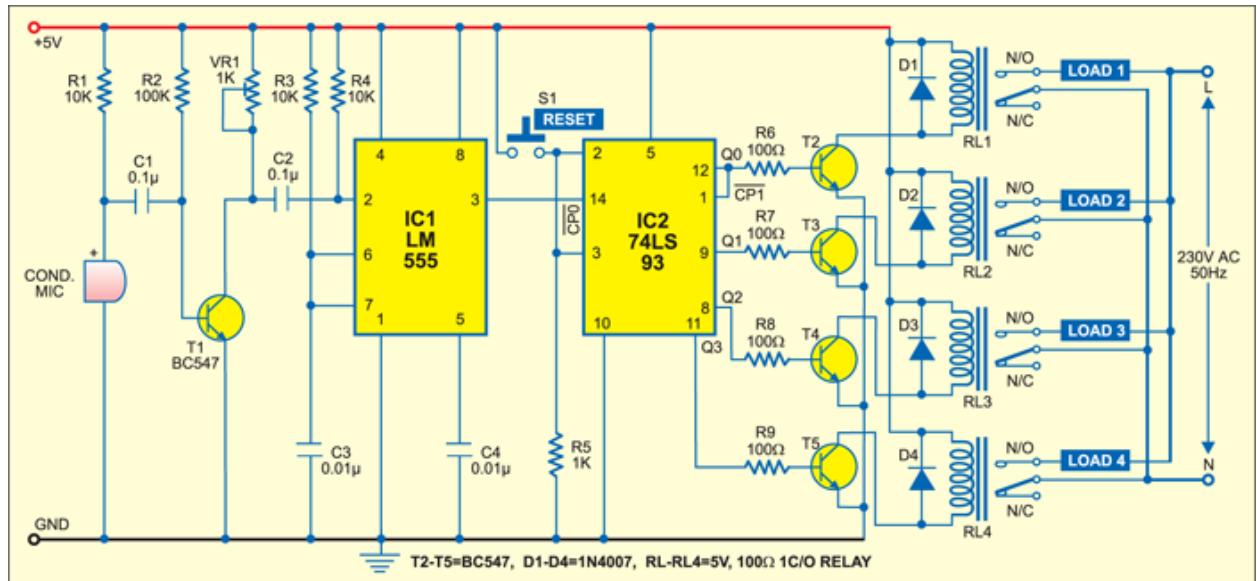
120. Controllable Electronic Load Circuit for DC Power Supply

If you are interested in testing voltage-regulated power supplies under loaded conditions, here is a simple electronic load circuit controllable from a single 2-12V, 200mA power supply. The variable power supply is generated from regulator LM317 [119].



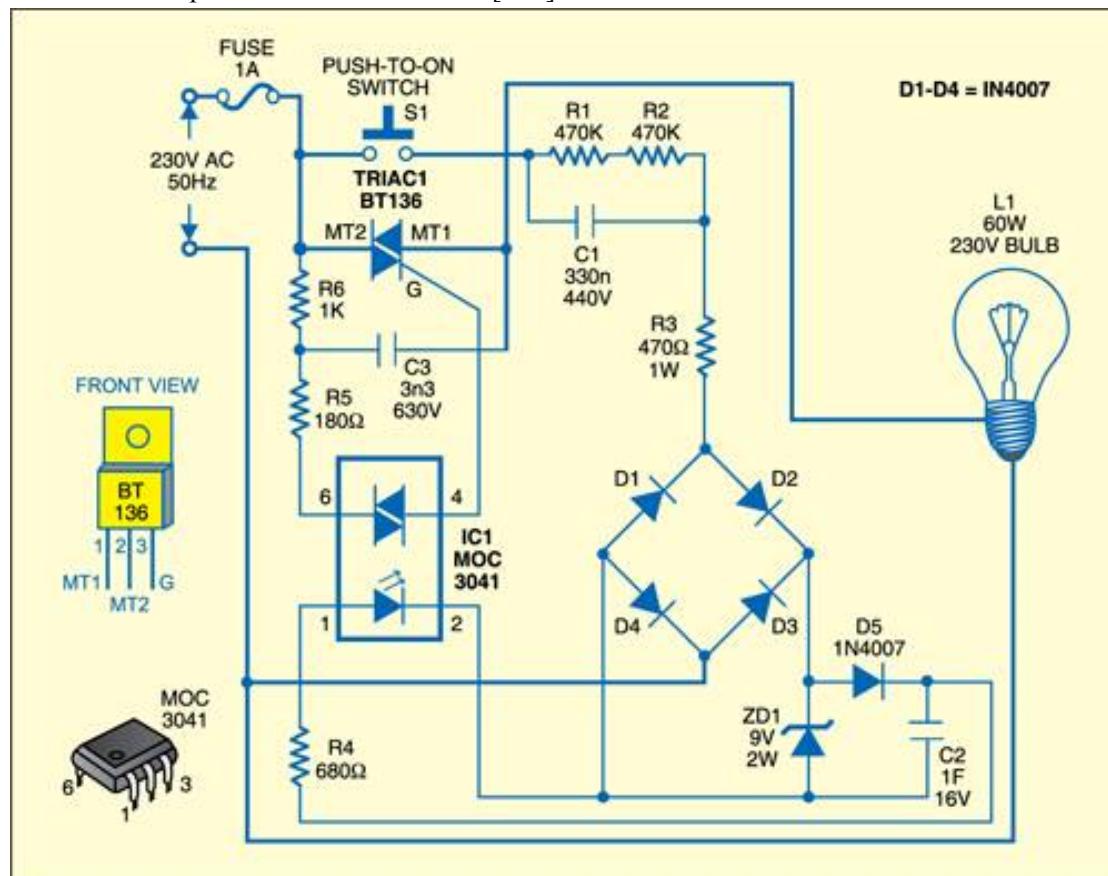
121. 16-Way Clap-Operated Switch

Control your home appliances without getting out of your bed. You just have to clap in the vicinity of the microphone used in this circuit, which you can keep by the bedside. You can switch on/off up to four different electrical equipment (TV, fan, light, etc) in 16 different ways [120].



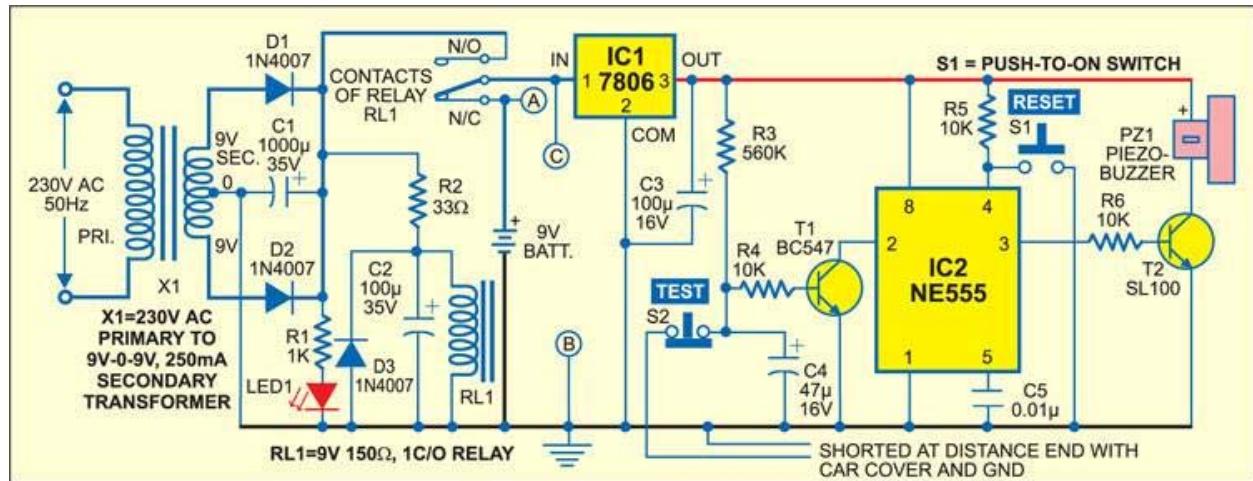
122. Bedroom Light

This circuit allows you enough time to reach your bed and lie down before the bedroom lamp switches off automatically. You can find a number of applications for this circuit. The circuit draws almost no power when it is inactive [121].



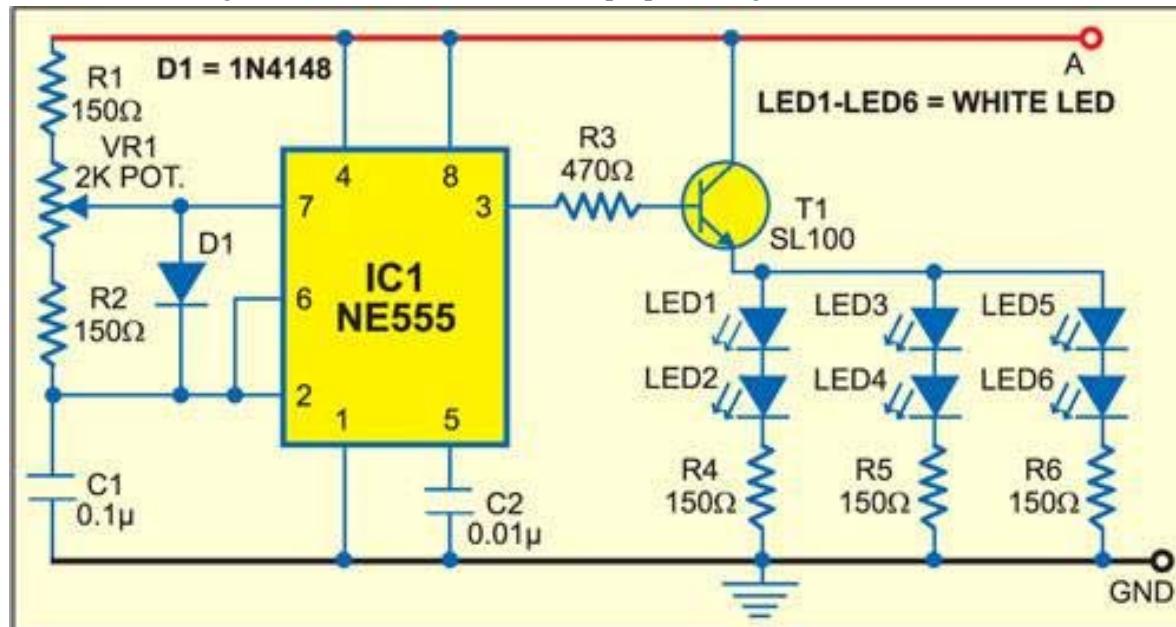
123. Inexpensive car Protection Unit

For car protection, custom-made units are available but they are costly. Here's a circuit to protect car stereo, etc from pilferage that costs less and requires no adjustments in the car but a good car cover [122].



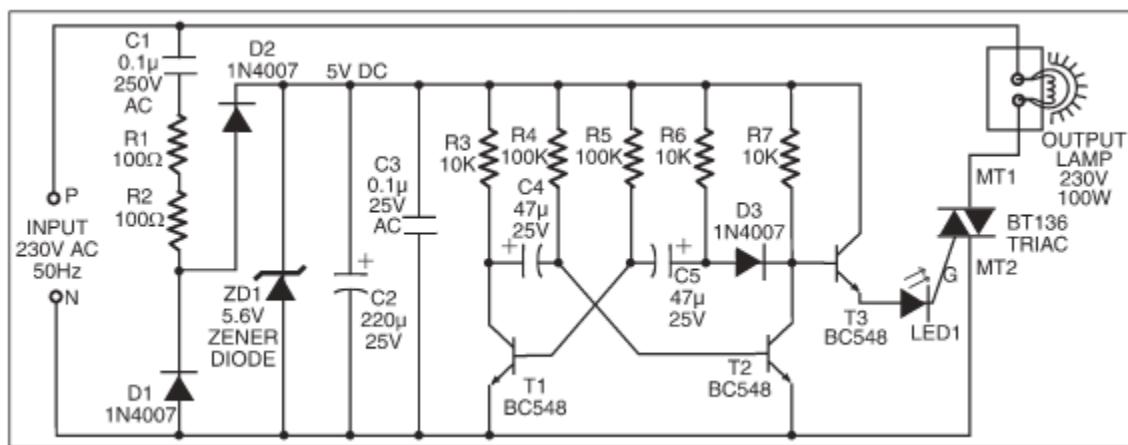
124. White LED-Based Emergency Lamp and Turning Indicator

White LEDs are replacing the conventional incandescent and fluorescent bulbs due to their high power efficiency and low operating voltage. These can be utilised optimally for emergency lamp and vehicle turning indication. The circuits for the purpose are given here [123].



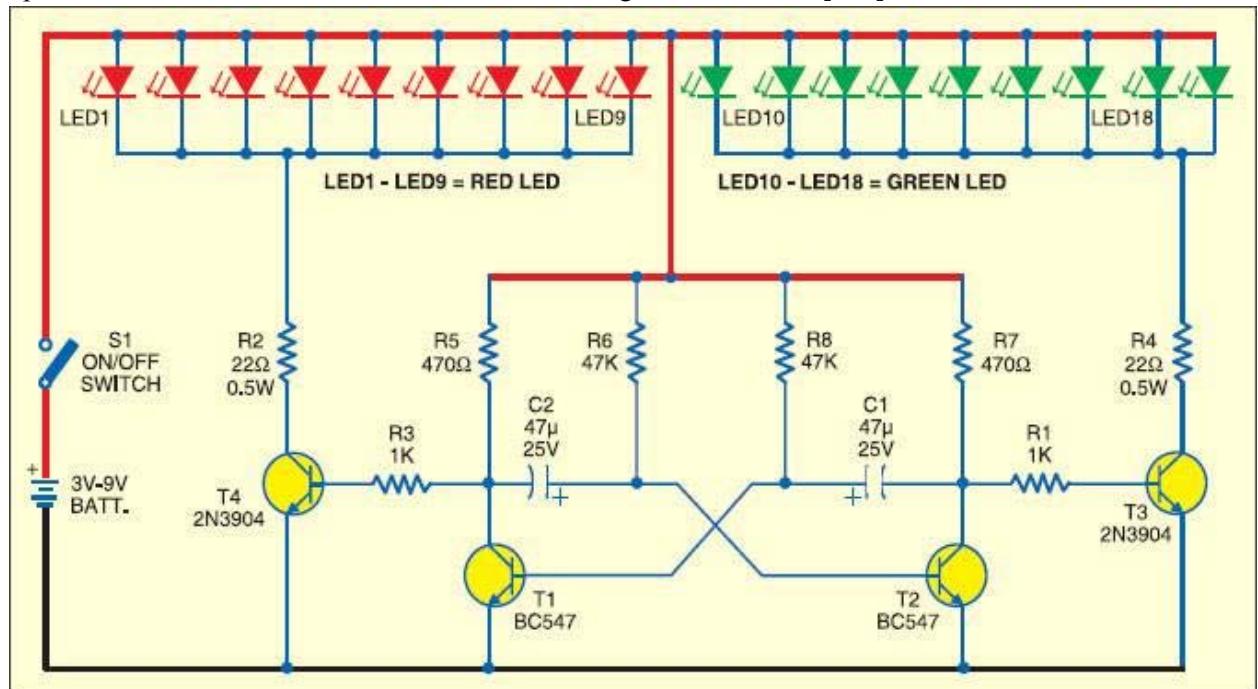
125. Mains-Operated Christmas Star

Here is a low-cost circuit of Christmas star that can be easily constructed even by a novice. The main advantage of this circuit is that it doesn't require any step-down transformer or ICs [125]



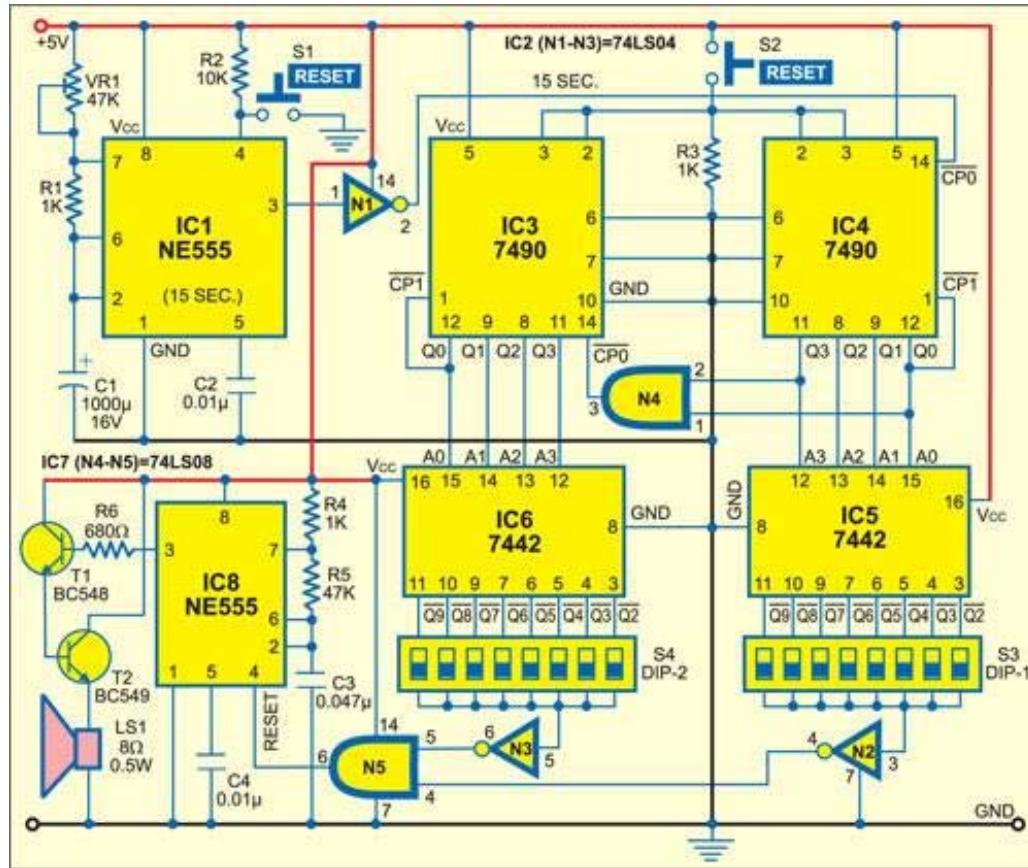
126. LED Lighting For Christmas

Using light effects for decoration on festive occasions is a normal practice. Designers are coming up with varieties of electronic circuits to fill the imagination of users [126].



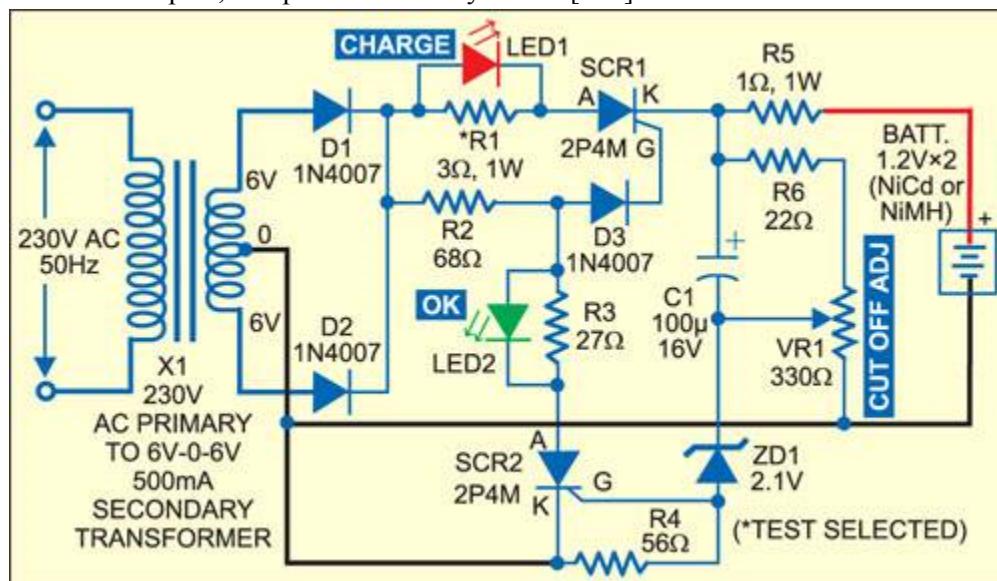
127. Timer for Geyser

This timer circuit for geyser sounds an alarm after the set timing of 22 minutes when the water is heated up [127].



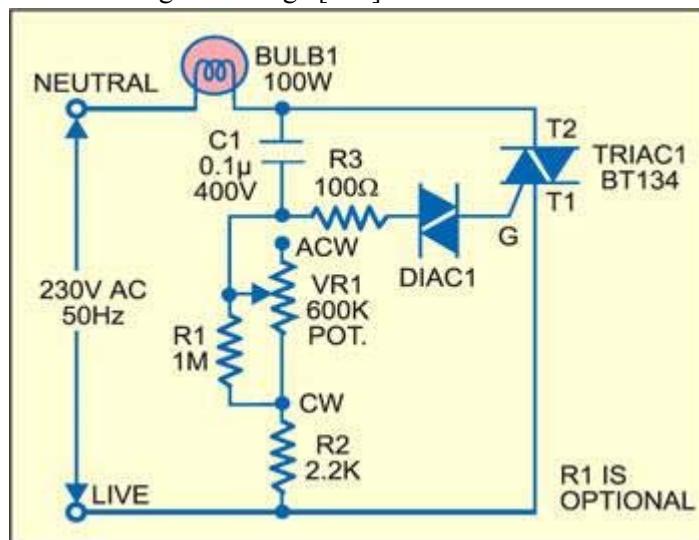
128. Multicell Charger

Using this charger, you can safely charge up to two pieces of Ni-Cd cells or Ni-MH cells. The circuit is compact, inexpensive and easy-to-use [128].



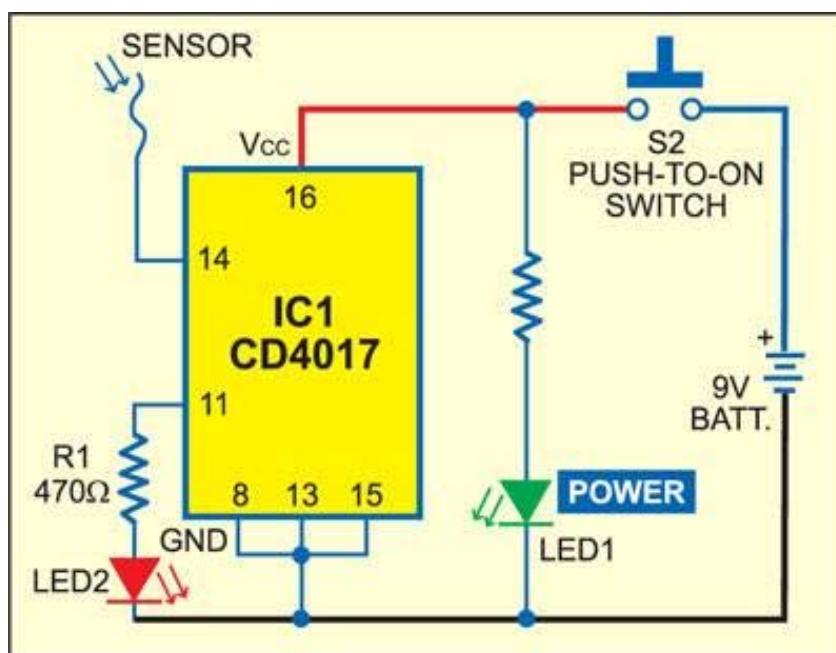
129. Light Dimmer that Doubles as

Measure AC mains voltage without using a multimeter. All you need to do is to slightly modify the light dimmer fitted at the base of a table lamp for use as a voltmeter. When the dimmer is turned anticlockwise to a point where the filament glow is just visible, that point can be used as the reference point for measuring the voltage [129].



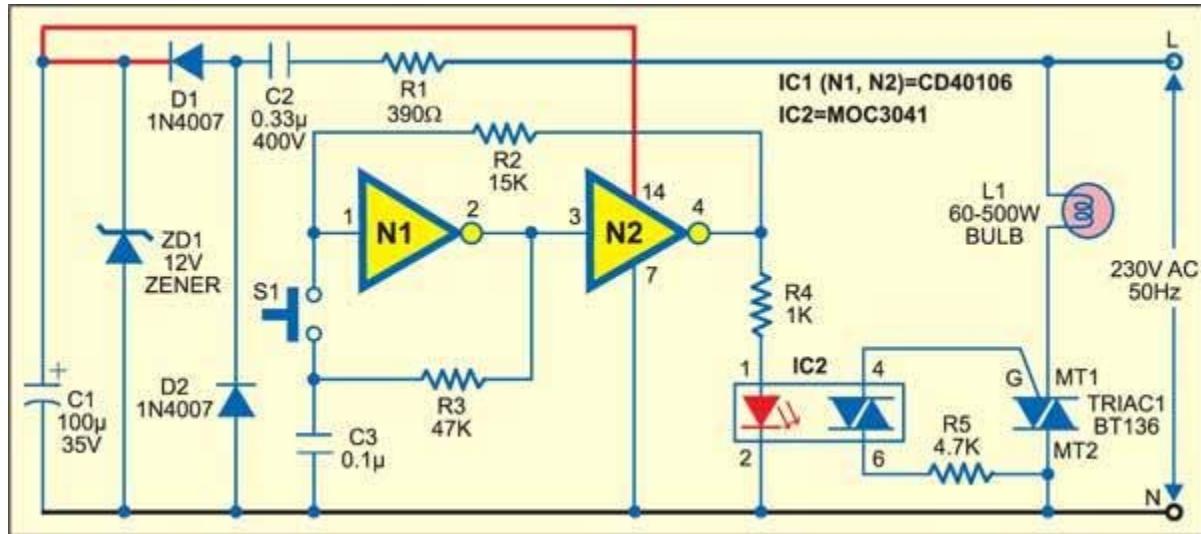
130. 220V Live Wire Scanner

This simple circuit lets you scan a 220V live wire. The clock input of the IC is connected to a wire, which acts as the sensor. Here, we have used 10cm length of 22SWG wire as the sensor [130].



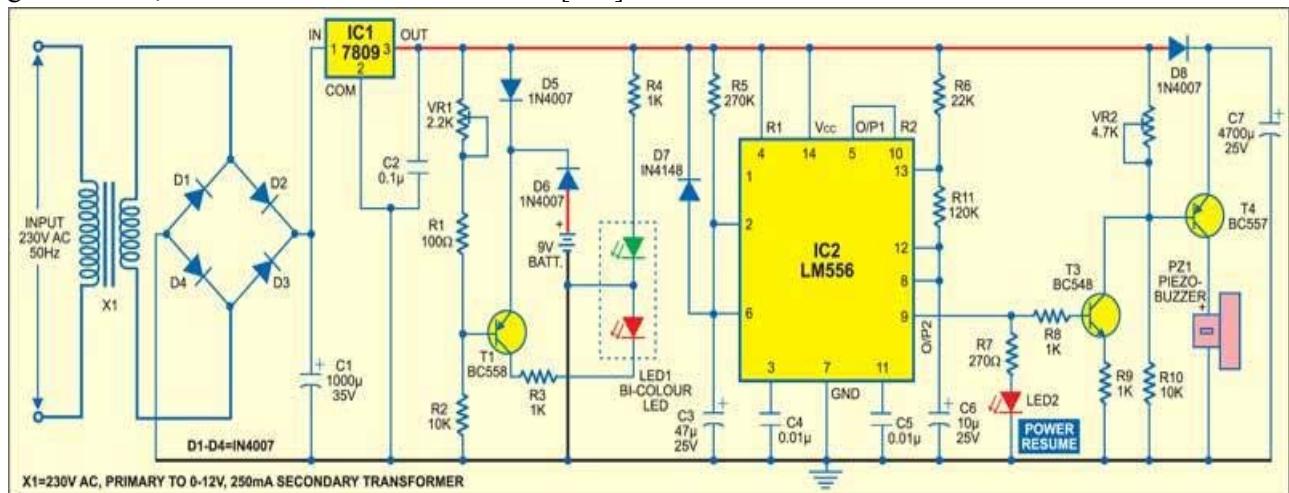
131. Smart Switch

To switch on the mains voltage, either a mechanical switch or a relay offers a simple solution. However, the relay and its associated components occupy a lot of space and cannot be accommodated in a standard switch box. The smart switch circuit, shown here, offers a better alternative. It is nothing but an on/off controller and uses an electronic circuit that behaves like a normal switch. A flat pushbutton control provides an aesthetic look to your switch panel [131].



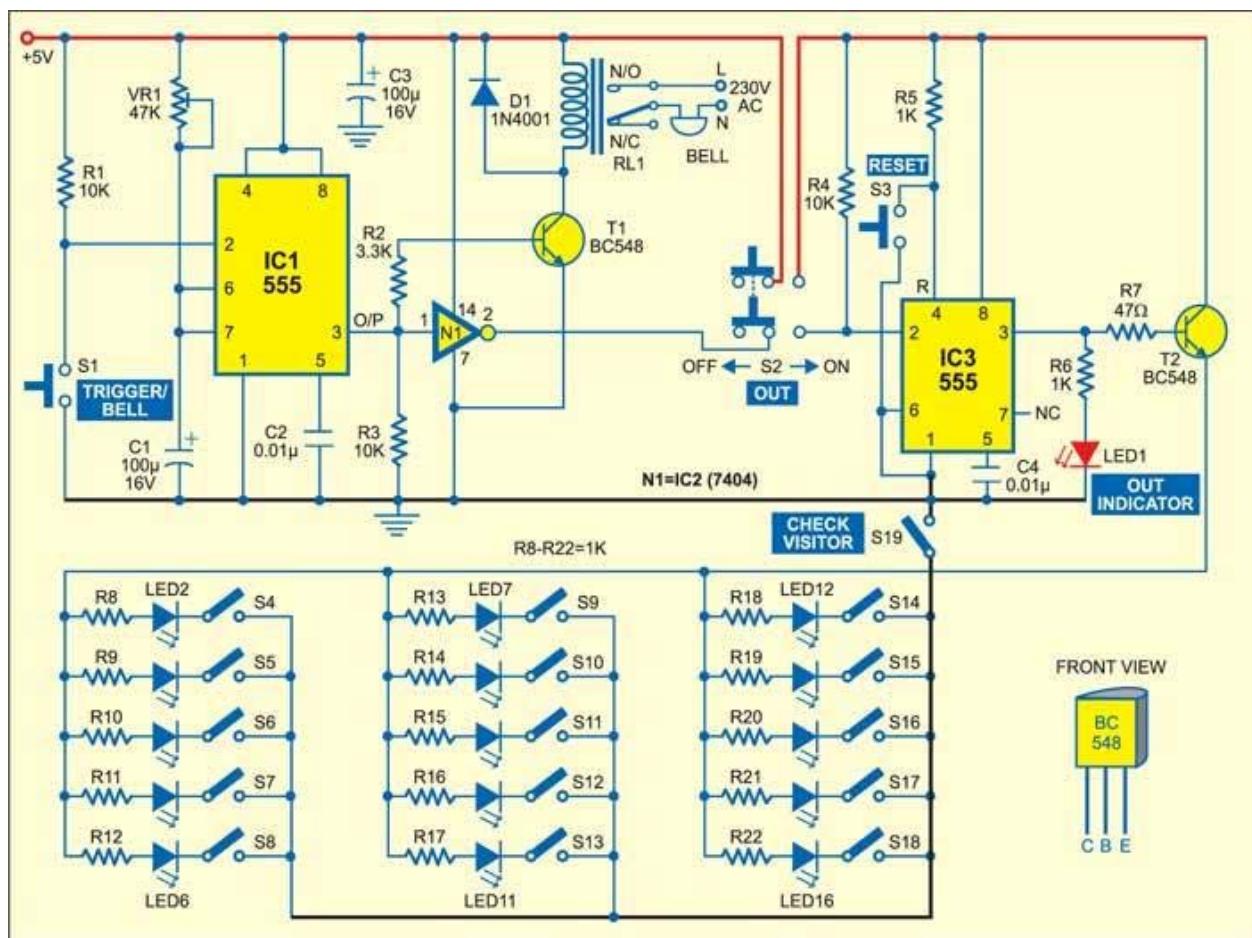
132. Power Failure and Resumption Alarm

This circuit gives audio-visual indication of the failure and resumption of mains power. The circuit is built around dual timer IC LM556. When mains is present the bicolour LED glows in green colour, and when mains fails it turns red [131].



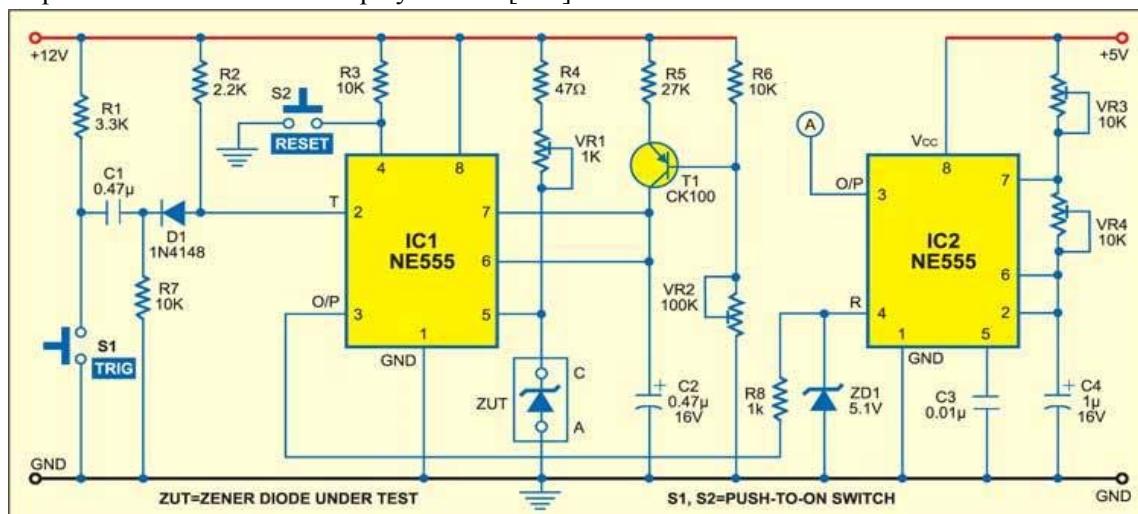
133. Doorbell-Cum-Visitor Indicator

This doorbell circuit can also give identification of the visitor to your home in your absence. When you're home, you can use it simply as a normal doorbell [133].



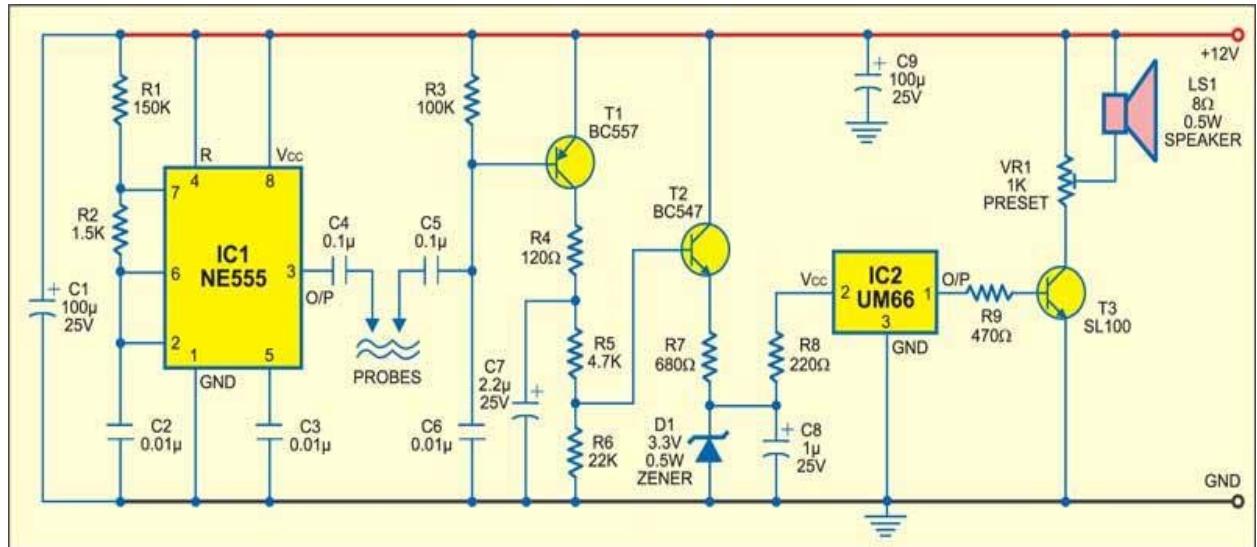
134. Zener Value Evaluator

Using this simple circuit and a known-value zener diode, you can find the breakdown voltage value of any zener diode. The circuit is divided into two sections: zener evaluator and display unit. Regulated 12V and 5V are required to power the zener evaluator section, while the display section works off only 5V. Connect +5V, point A and ground of the zener evaluator section to the respective terminals of the display section [134].



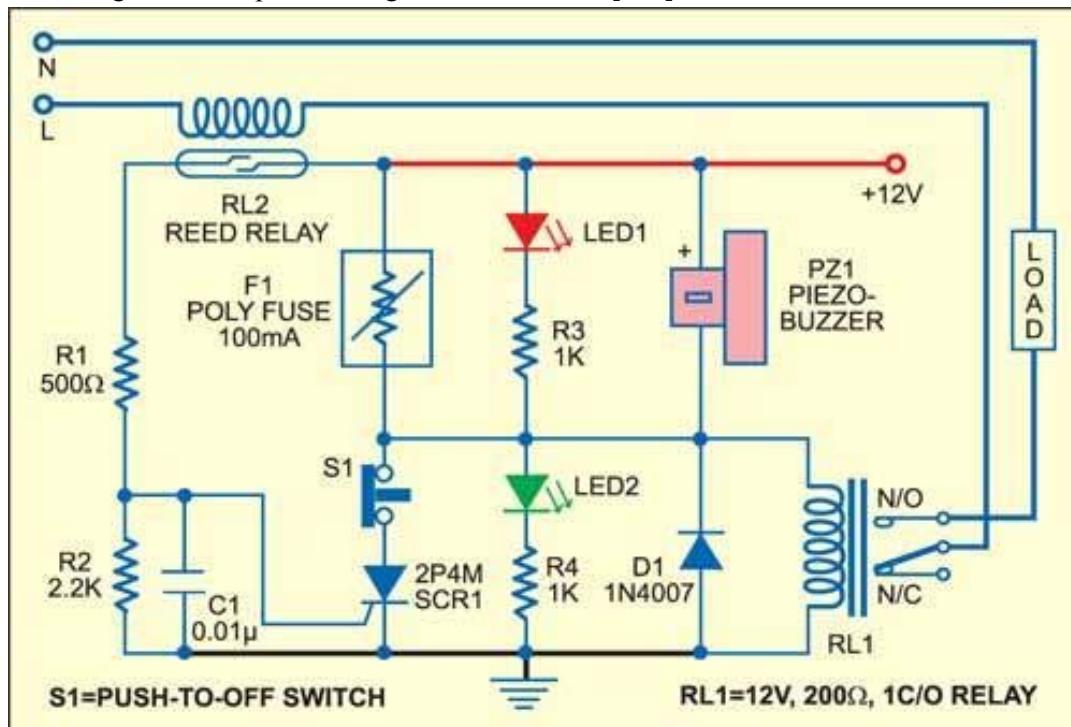
135. Liquid-Level Alarm

In water-level controllers for tanks, a DC current is passed through the metallic probes fitted in the water tank to sense the water level. This causes electrolysis and corrosion of probes, inhibiting the conduction of current and degrading its performance. As a consequence, probes have to be replaced regularly to maintain proper current flow [135].



136. Electronic Fuse

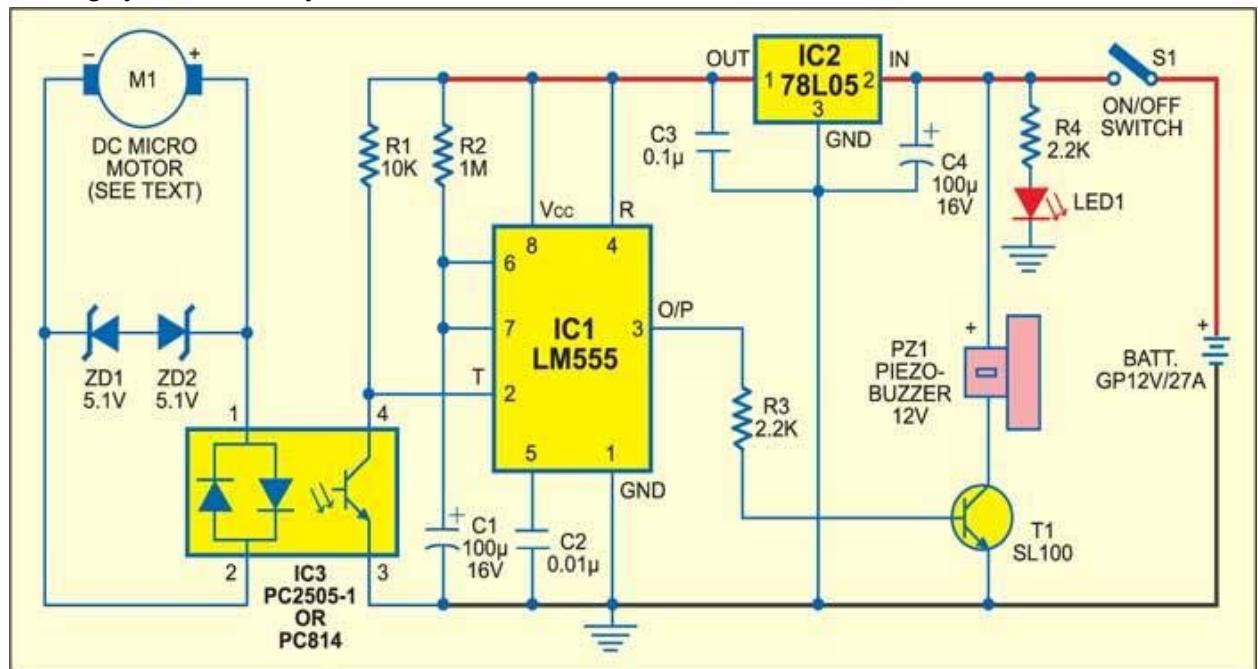
An absolute necessity of every electronics lab is a workbench power supply. The power supply should be regulated and protected against short circuit [136].



137. Bicycle Guard

This antitheft device for bicycles is inexpensive and can be constructed easily using a few components [137]. This antitheft device for bicycles is inexpensive and can be constructed easily using a few components.

At the heart of the circuit is a wheel rotation detector, realised using a DC micro motor. For the purpose, you can use the micromotor (spindle motor) of a discarded local CD deck mechanism. With a little skill and patience, you can easily attach a small metallic pulley covered with a rubber washer to the motor spindle. Thereafter, fix the unit in the back wheel of the cycle, like the existing dynamo assembly.



Power supply switch S1 should be kept ‘on’ when you are using this bicycle guard. When it is flipped towards ‘on’ position, the circuit gets power from the miniature 12V battery. Now LED1 lights up and resistor R4 limits the LED current. Next, the monostable built around IC1, which is CMOS version of timer LM555, is powered through a low-current, fixed-voltage regulator IC2 (78L05).

Initially, when the bicycle is standing still, the monostable output at pin 3 of IC1 is low and the circuit is in idle state. In the event of a theft attempt, forward or reverse rotation of the DC motor induces a small voltage at its DC input terminals and the internal LED of 4-pin DIP AC input isolator optocoupler IC3 (PS2505-1 or PC814) glows. As a result, the internal transistor of IC3 conducts and pin 2 of IC1 is pulled low by the optocoupler and the monostable built around IC1 is triggered.

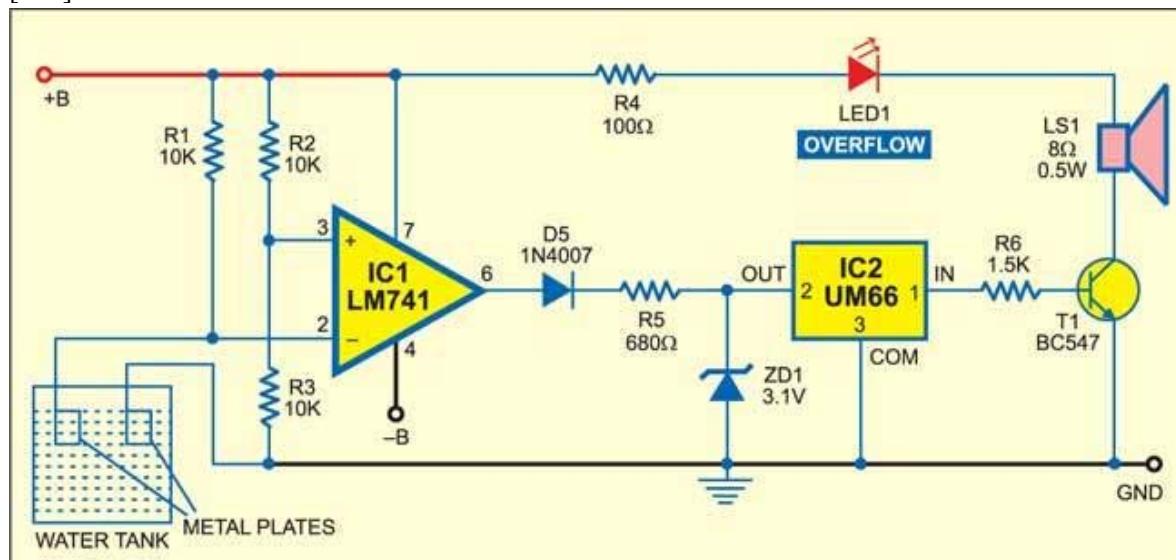
The output at pin 3 of IC1 now drives piezobuzzer-driver transistor T1 via resistor R3 and the buzzer starts sounding to alert you. In this circuit, the buzzer remains ‘on’ for around two minutes. You can change this time by changing the values of resistor R2 and capacitor C1.

Zener diodes ZD1 and ZD2 (each 5.1V) act as a protector for optocoupler IC3. The costly GP12V/27A battery is used here due to its compact size and reliability. 12V active buzzers with high-pitched tone output may be used with this circuit. These are readily available in the market.

Note. The specific optocoupler is used here deliberately, instead of a bridge rectifier, to increase the circuit's detection sensitivity. Never replace the same with a DC optocoupler.

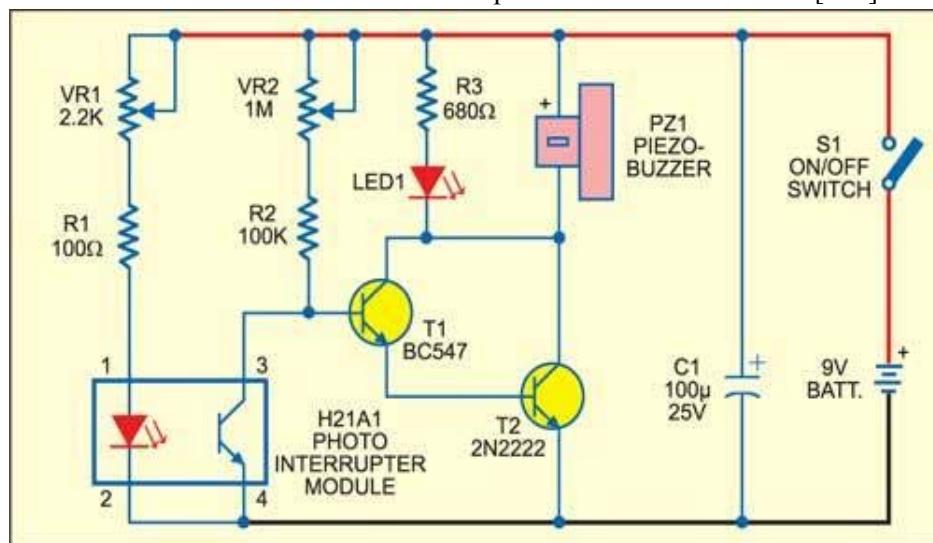
138. Water-Tank Overflow Indicator

Water is a vital but scarce natural resource. To prevent water wastage, this water-tank overflow indicator comes in handy. It gives audio as well visual alarm whenever the water tank overflows [138].



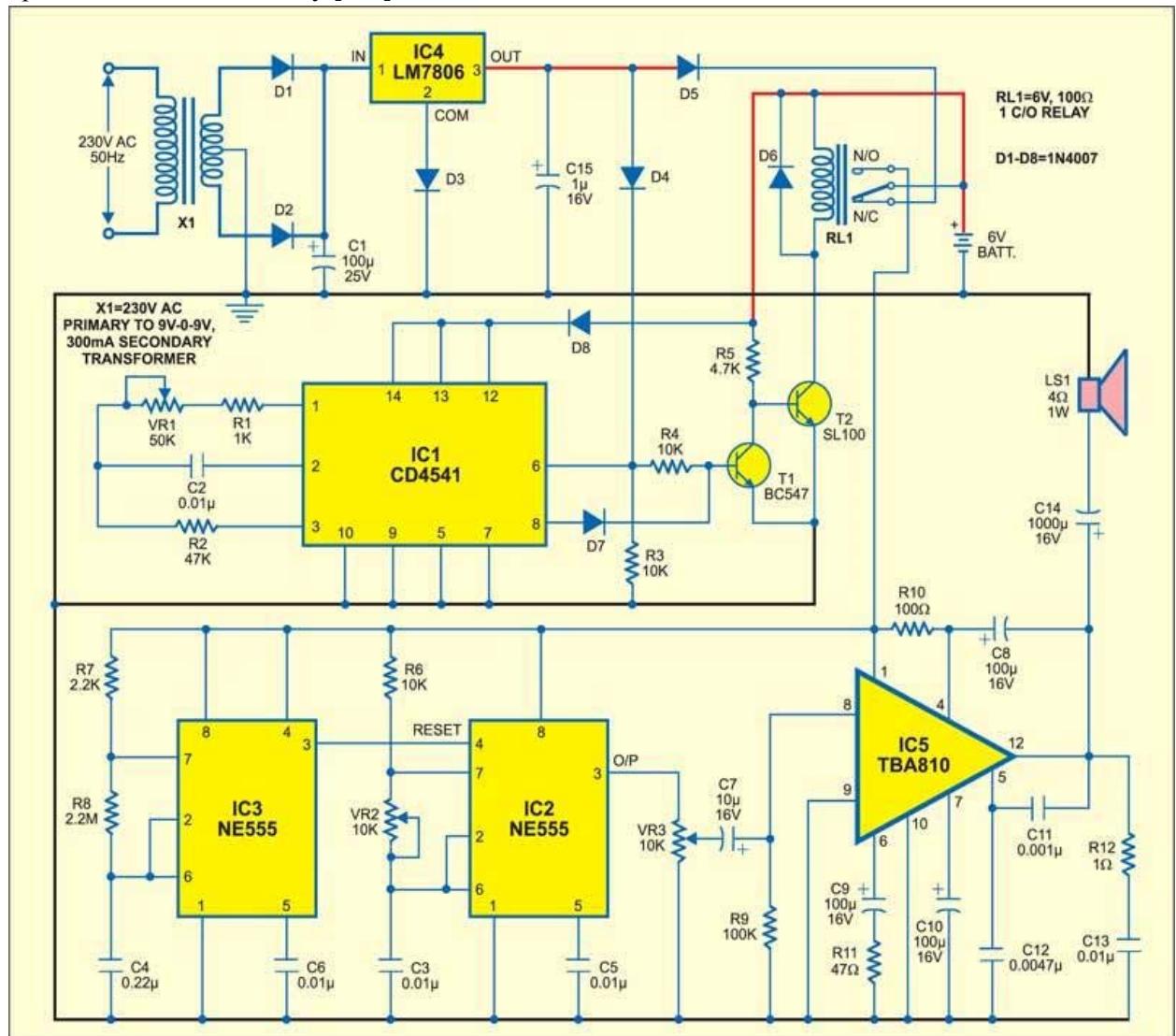
139. Simple Smoke Detector

This simple smoke detector is highly sensitive but inexpensive. It uses a Darlington-pair amplifier employing two npn transistors and an infrared photo-interrupter module as the sensor. The circuit gives audio-visual alarm whenever thick smoke is present in the environment [139].



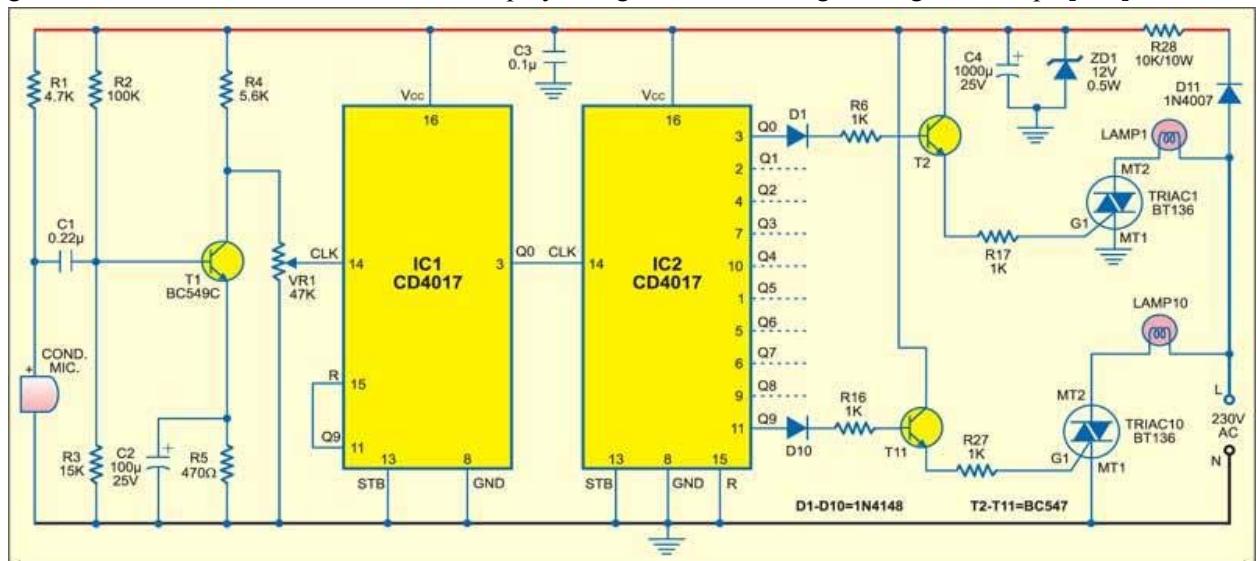
140. Remote Emergency Alarm for Unmanned Lifts

In unmanned lifts or elevators, sudden power failure cannot be detected from the remote operating room, and this can prove dangerous for the lift users. Here is a simple circuit that sounds an alarm in the remote lift/elevator control room in the event of power failure. The circuit operates off a 6V DC battery [140].



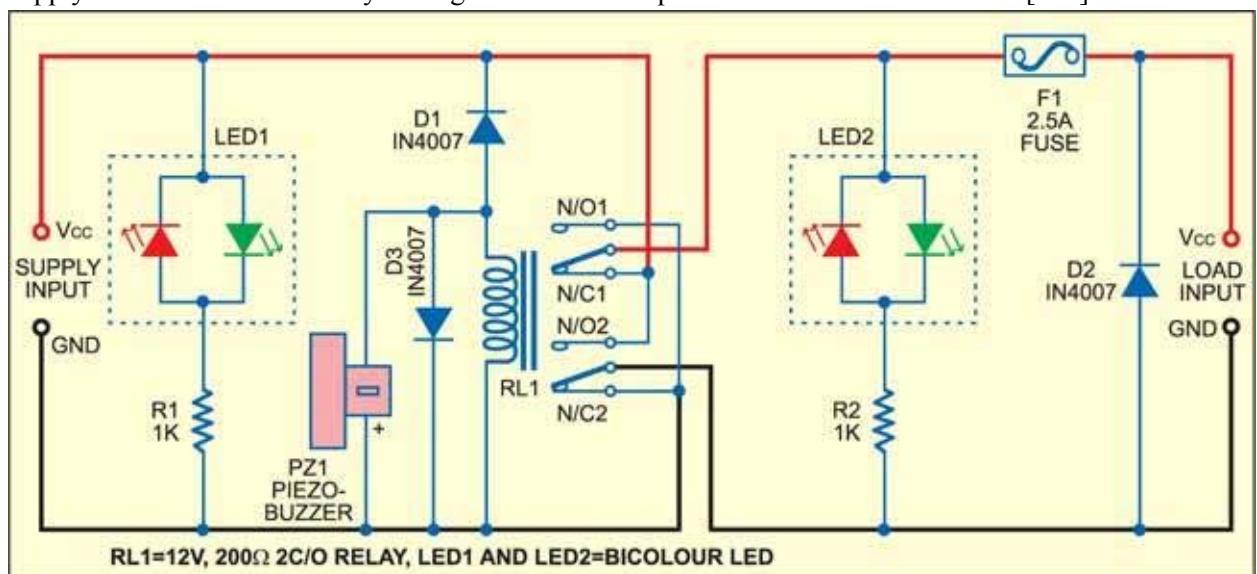
141. Audio-Controlled Running Light

This mains-operated audio-controlled running light can be used in discotheques. The lamps glow in running sequence as per the sound of music. Of the ten AC lamps, only one lamp permanently glows if there is no sound. When music is played, light starts ‘running’ through the lamps [141].



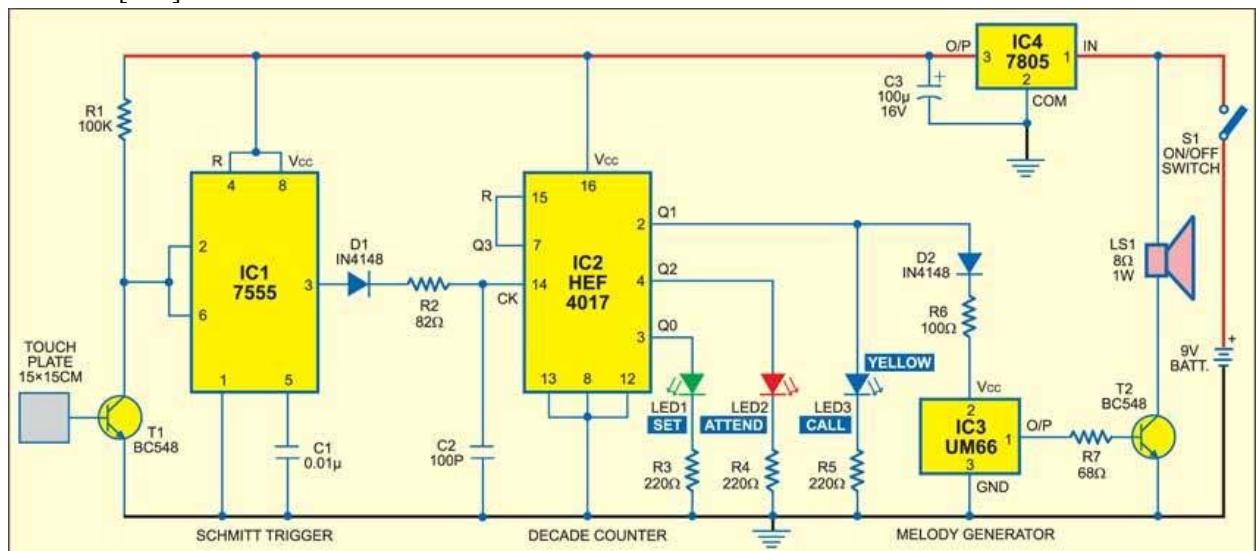
142. Power Supply Reversal Correcter-Cum-Preventer

When power-supply polarities of an electronic device are accidentally interchanged, the device runs the risk of damage. The danger can be avoided by adding this tiny circuit to the power supply section of the device. The circuit will instantly correct the interchanged poles of the power supply and warn of the error by raising an alarm accompanied with a visual indication [143].



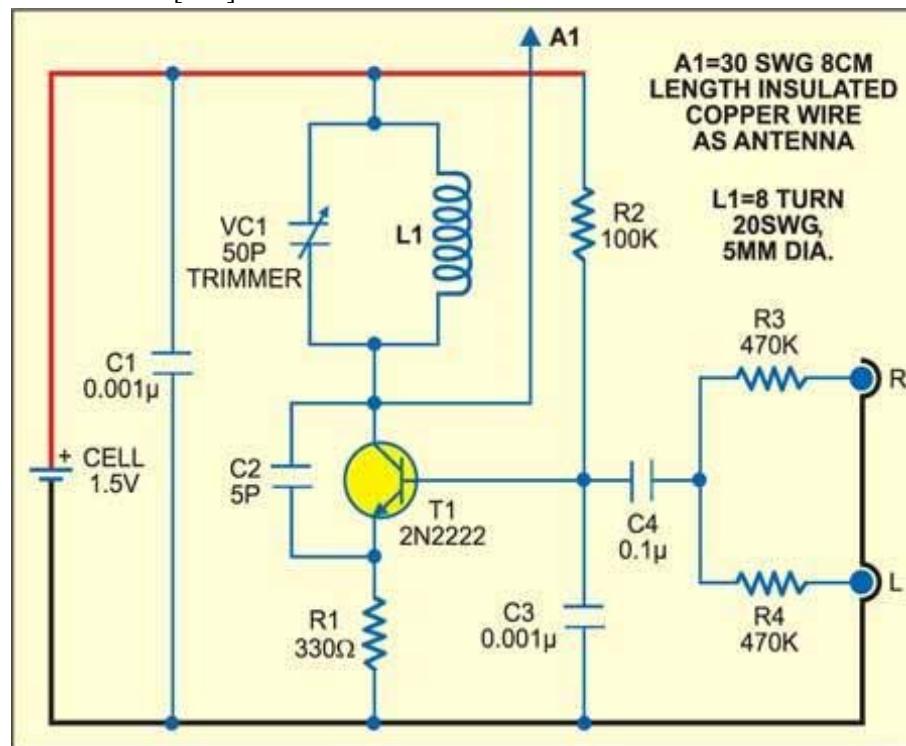
143. Panic Plate

Useful for the elderly and ailing persons, this touch-sensitive circuit sounds a panic alarm to catch the attention of others for immediate help. The touch plate fixed on the wall near the bedside gives an easy access to the person on bedrest so that he may call for assistance without much difficulty. Yellow LED3 on the panel indicates the call and the red LED indicates an immediate attention [144].



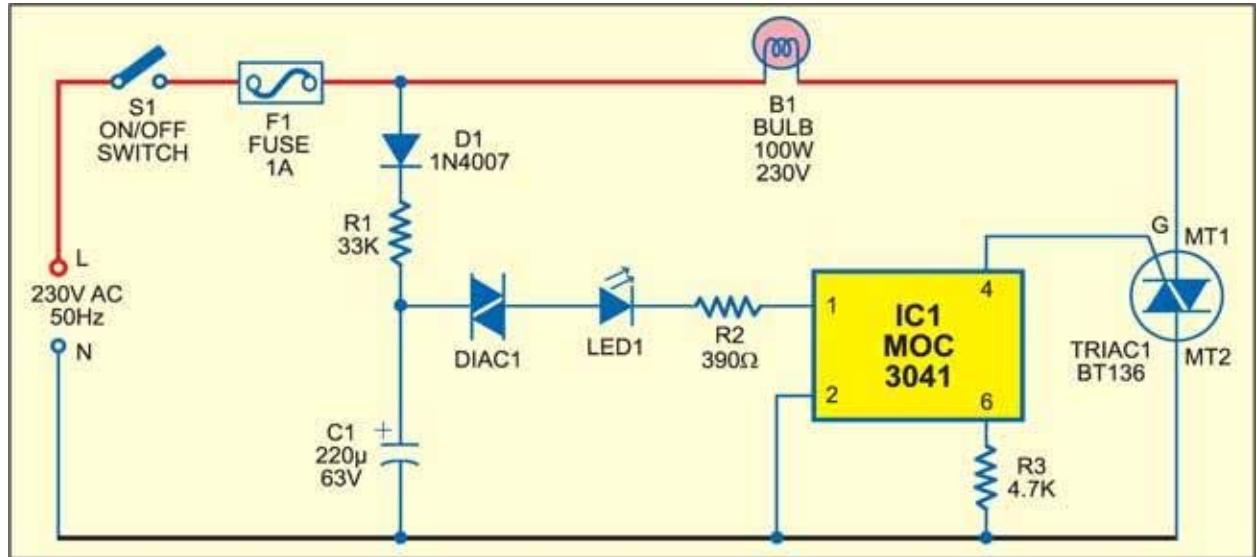
144. FM Adaptor for Car Stereo

If your car has an FM radio with stereo output but no inbuilt cassette player, this circuit will come handy for listening to your favourite collection of music from your personal audio player through the FM-stereo car radio [145].



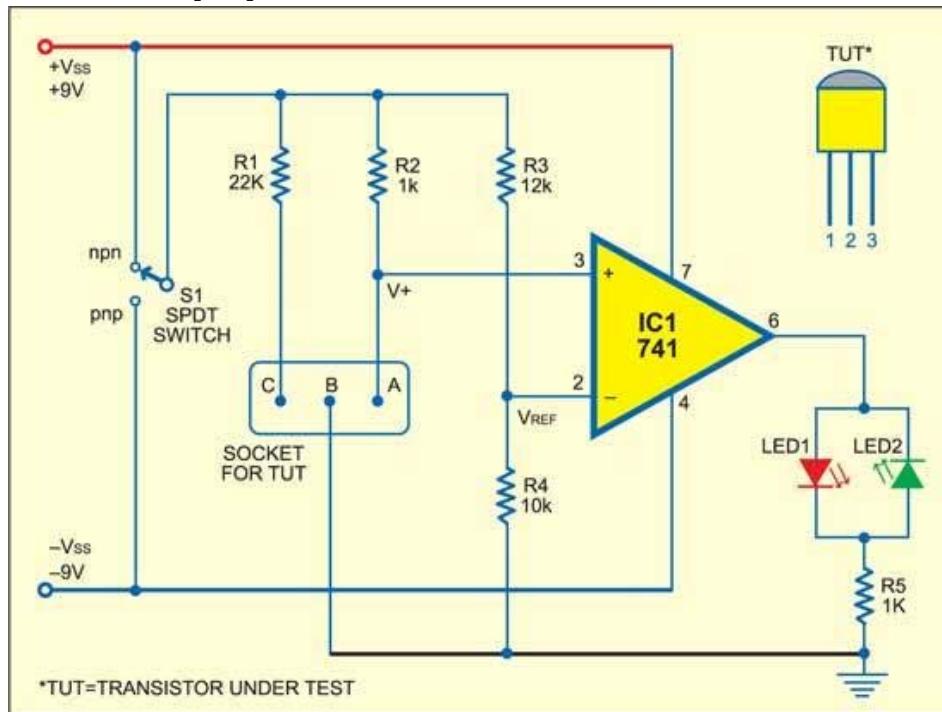
145. Twinkle Twinkle X'mas Star

Christmas just would not be Christmas if you do not put a flashing star on your Christmas tree. Here is the circuit of such a flashing star [146].



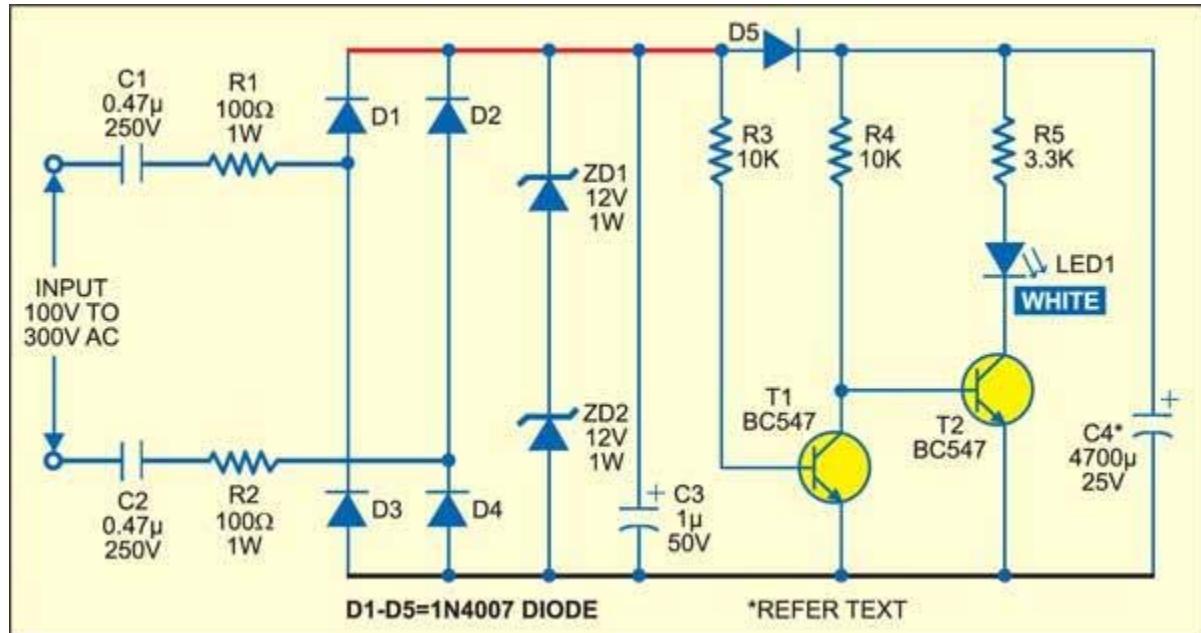
146. Simple Transistor Type and Lead Identifier

A bipolar junction transistor (BJT) has three regions, of which the emitter and the collector are made of the same type of semiconductor ('n' for npn and 'p' for pnp) but the base is of opposite type. If we consider the base and emitter terminals (or the base and collector terminals), we get a p-n junction diode. But if we hold collector and emitter terminals, we encounter two diodes connected back-to-back [147].



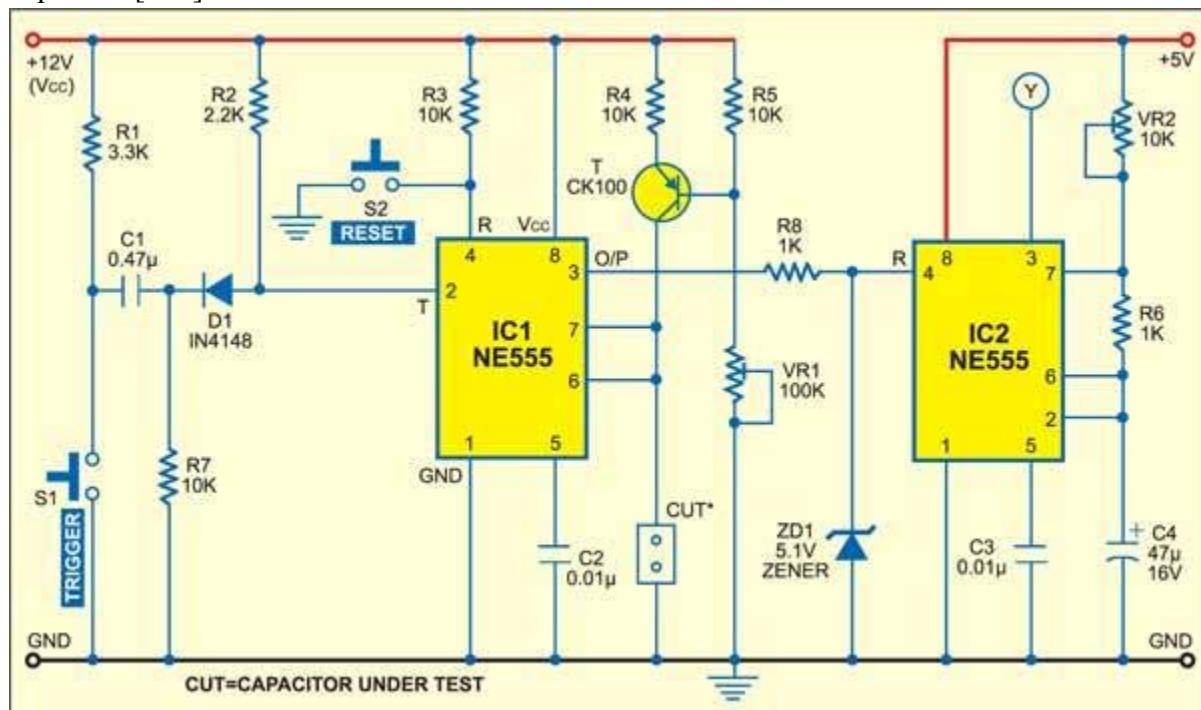
147. Mains Supply Failure Backup Light

In the event of a sudden blackout at night, this circuit switches on automatically to provide sufficient light for around 30 seconds (extendible), which is enough to switch on an emergency lamp or light up a candle [148].



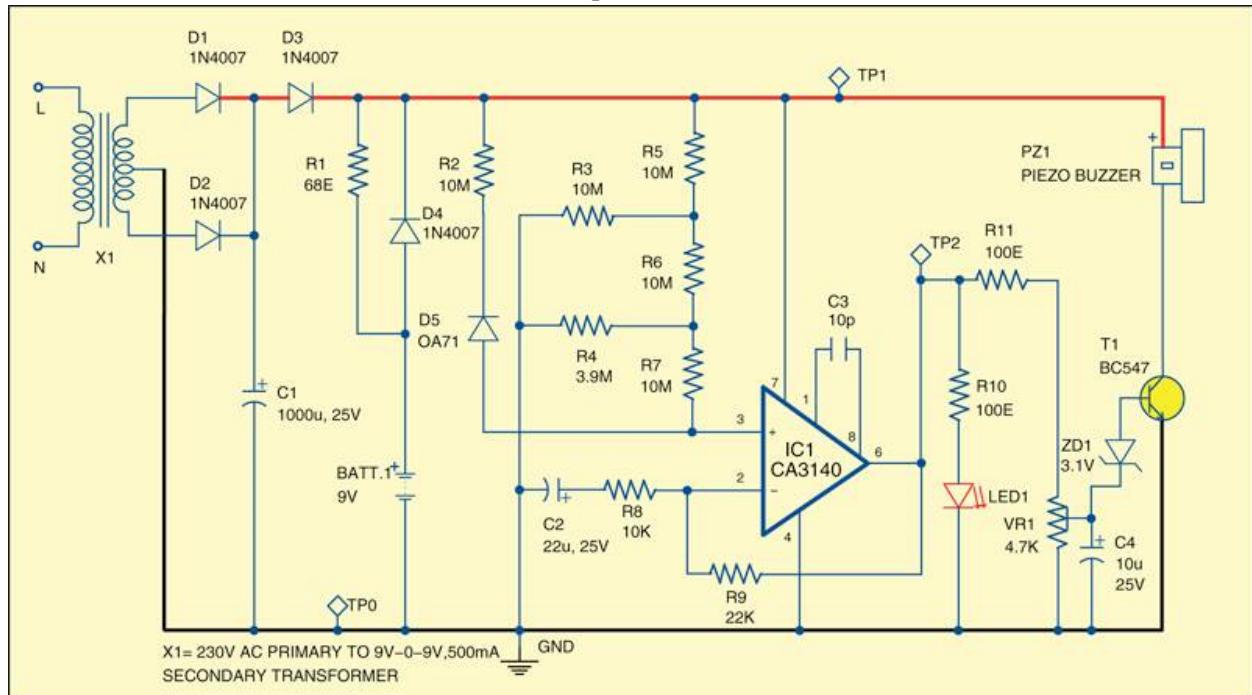
148. Capacitor Evaluator

Using this circuit and a known-value capacitor, you can find out the value of any capacitor [149].



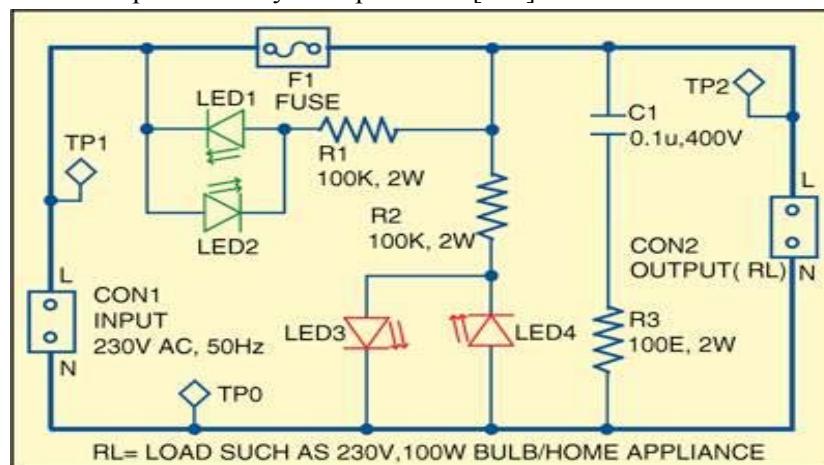
149. Signal Diode-Based Fire alarm

A simple signal diode can be used to build a highly sensitive firealarm. Silicon diodes like OA71 and 1N34 respond to infrared radiation and heat from fireby generating reverse current across their terminals. In reverse-bias mode, this effect is more significant. Typically, for each degree rise in temperature, the diode generates 2 mV. This characteristic is exploited in this circuit to sense fire.The circuit can detect firefrom a distance of up to around 30 cm [150].



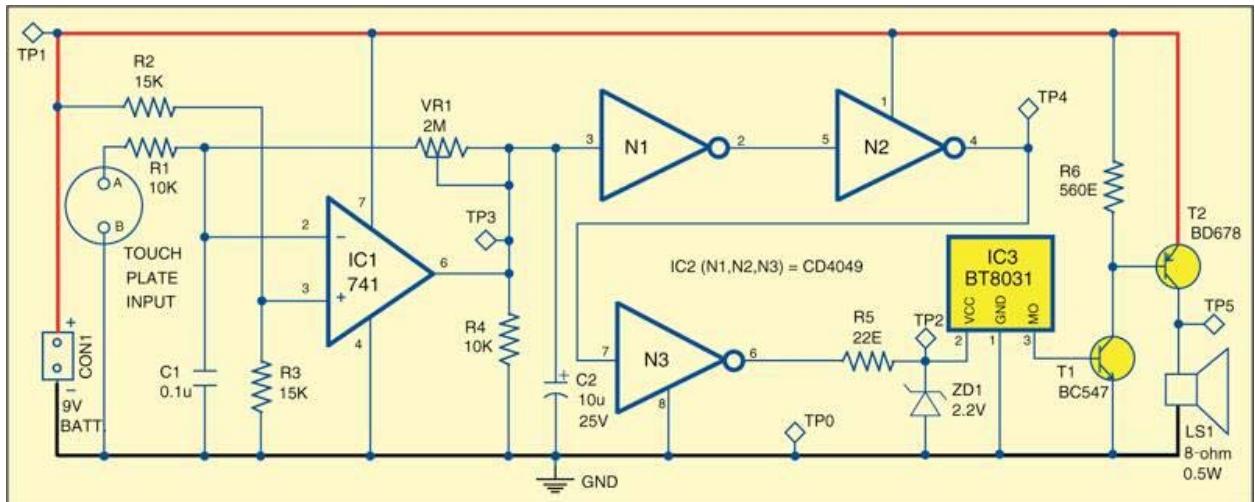
150. Blown-Fuse Indicator for AC load

This simple circuit to monitor the state of fuse and mains power supply is highly useful for AC-powered appliances. Sometimes these appliances suddenly stop working and we don't have any clue what has gone wrong. The problem can be so simple that it can be rectifiedjust by replacing the fuse. This circuit helps to identify such problems [151].



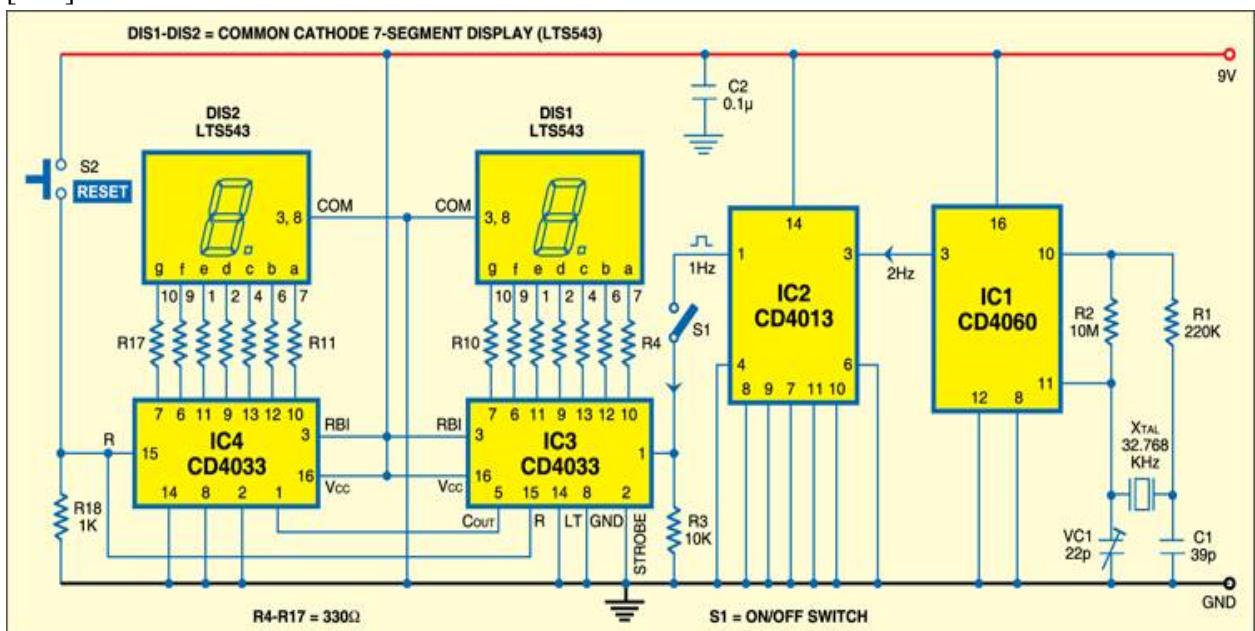
151. Ding Dong Touch Bell

“Ding dong bell” is a popular nursery rhyme. Shakespeare used the phrase “ding dong bell” in several plays. Today, ding dong is a popular ringtone used in phones and door bells. Here is a simple ding dong tone generator circuit built around a dedicated analogue IC [152].



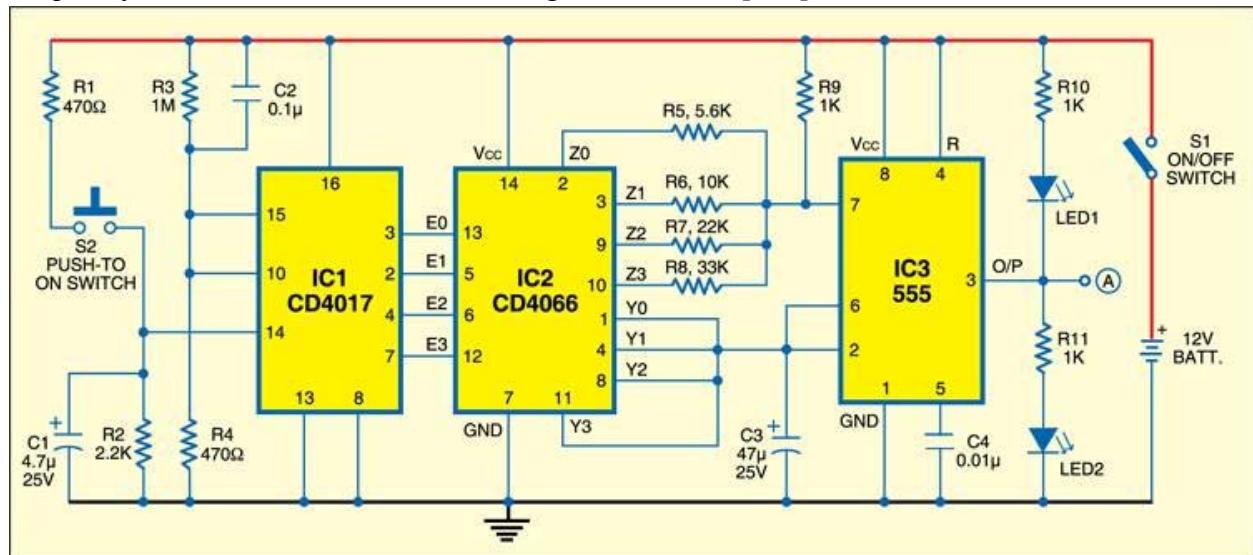
152. Low-cost Stopwatch

Here is a simple circuit of a stopwatch that can count up to 99 seconds. The circuit uses CD4060, CD4013, CD4033, LTS543 and some discrete components. A crystal-controlled oscillator generates 1Hz pulses. A 32.768kHz miniature crystal is used for the purpose [153].



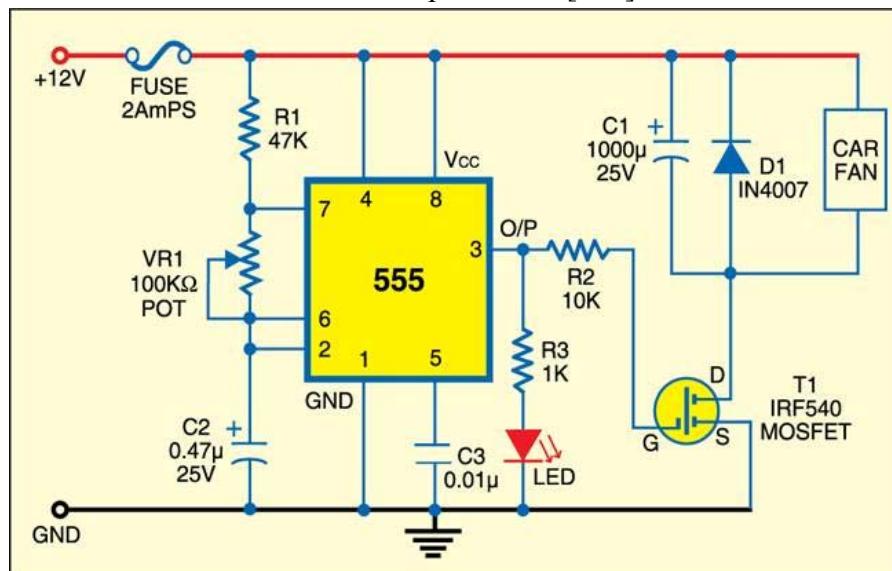
153. Digitally Adjustable Dancing Lights

You might have come across several types of adjustable dancing lights (flickering LEDs). Most of them use presets (variable resistors) to adjust the rate of switching. Being a mechanical component, the preset easily wears out with use and also introduces noise in the circuit. The circuit presented here selects different values of resistors to control the frequency of an astable multivibrator using timer IC 555 [154].



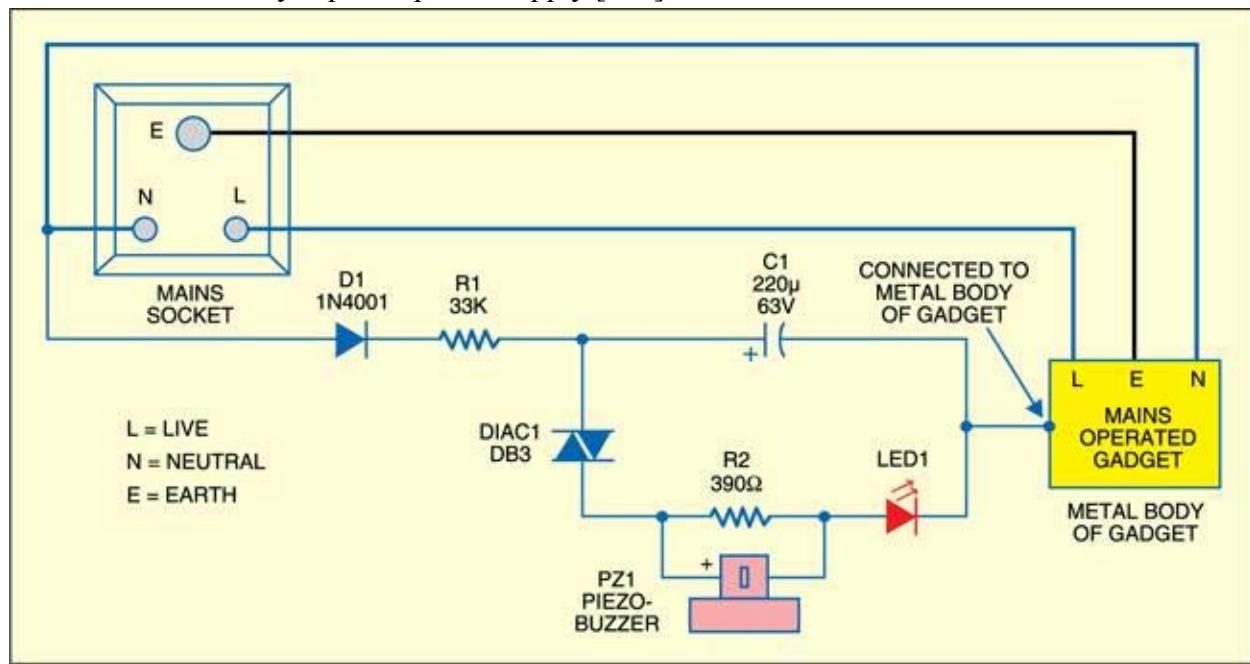
154. Car Fan Speed Controller

Using this circuit you can control the speed of 12V DC fans used in cars. The circuit is built around timer 555, which is wired as an astable multivibrator. The output of the multivibrator is fed to IRF 540 MOSFET. The fan is connected between the positive terminal of the battery and drain (D) of MOSFET T1. Capacitor C1 is connected in parallel to the fan to stabilise its speed. Free-wheeling diode D1 protects the motor from back emf. A fuse is included for protection [155].



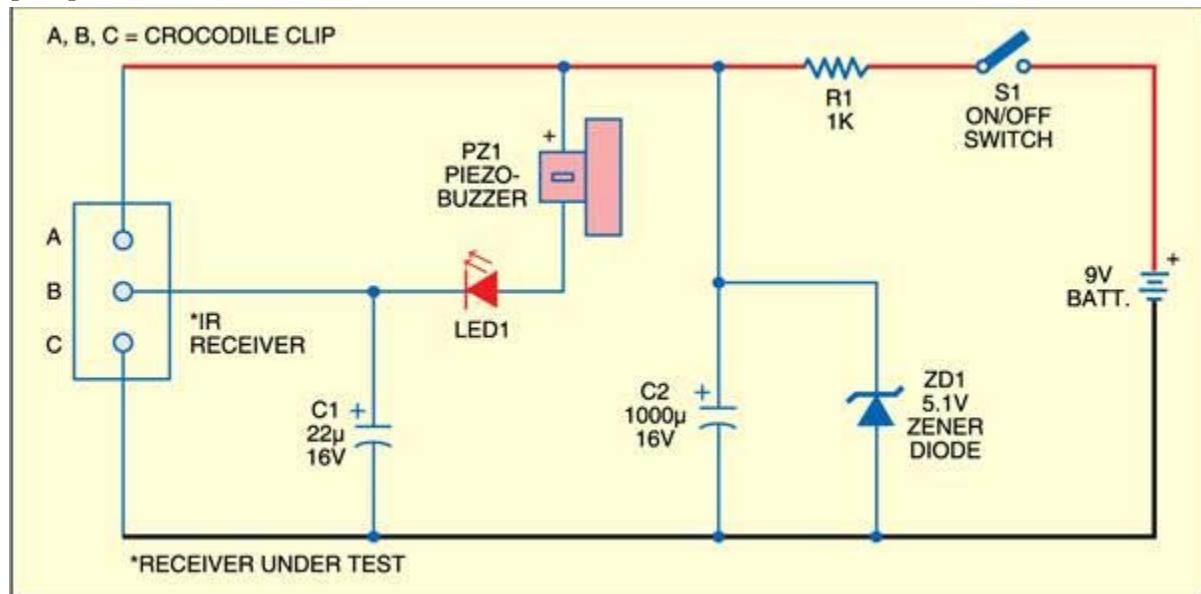
155. Shock-Hazard Warning

Electrical leakage can cause lethal shocks. But such an unfortunate situation can be avoided with this shock-hazard warning system. It uses minimal number of components and does not need any separate power supply [156].



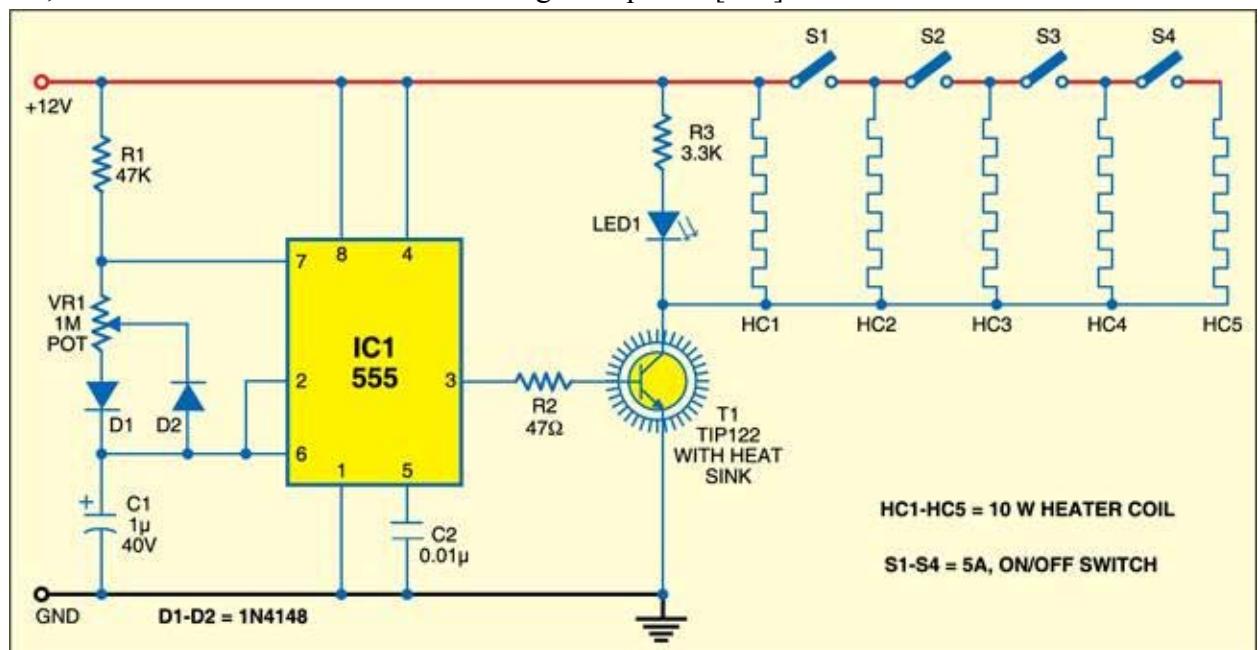
156. IR Receiver Module Tester

Here is a tester for on-board testing of IR receiver modules used for remote control of TV sets and VCD players. The circuit is very simple and can also function as a remote tester [157].



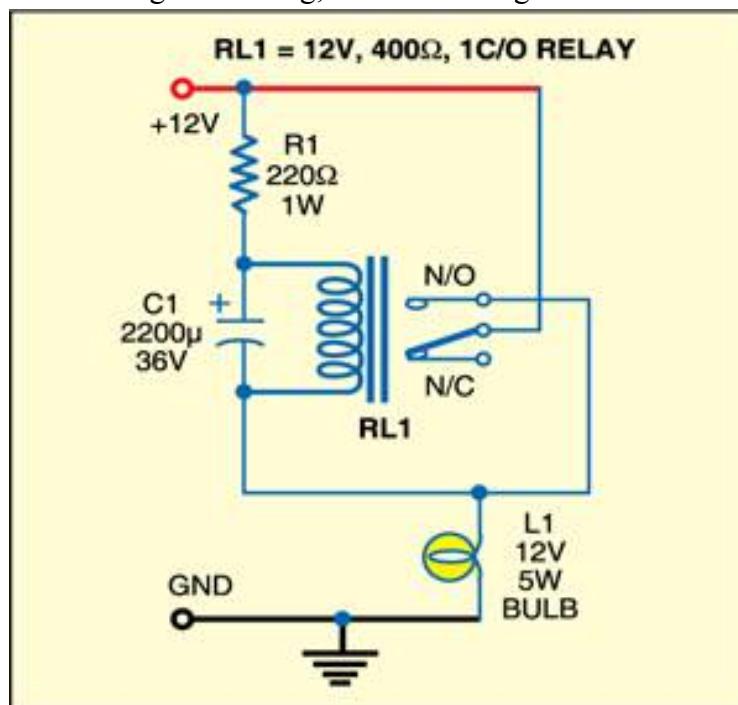
157. In-Car Food and Beverage Warmer

This is a very useful device for those who are frequently on the move. It will keep your tea, coffee or food warm while consuming little power [158].



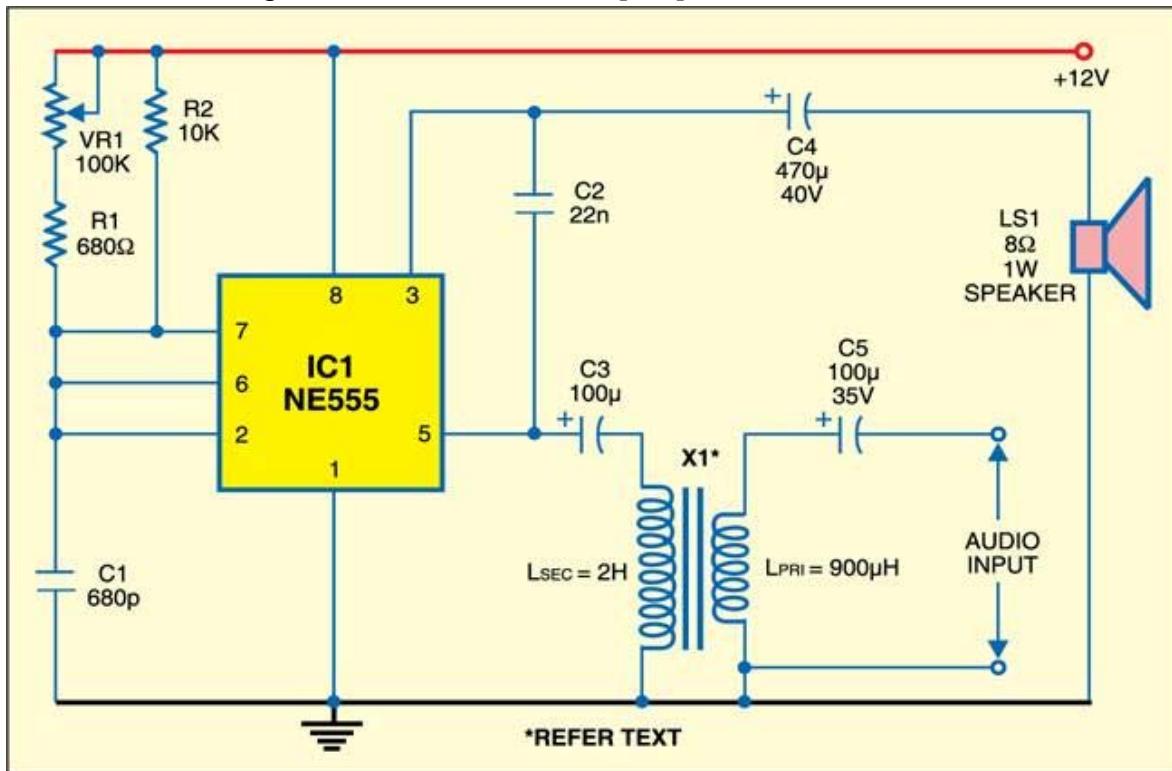
158. Three-Component Flasher

Since this flasher system uses only three components, it is relatively easy to build and install. It can be used for signal flashing, hazard warning and alternate flashing [159].



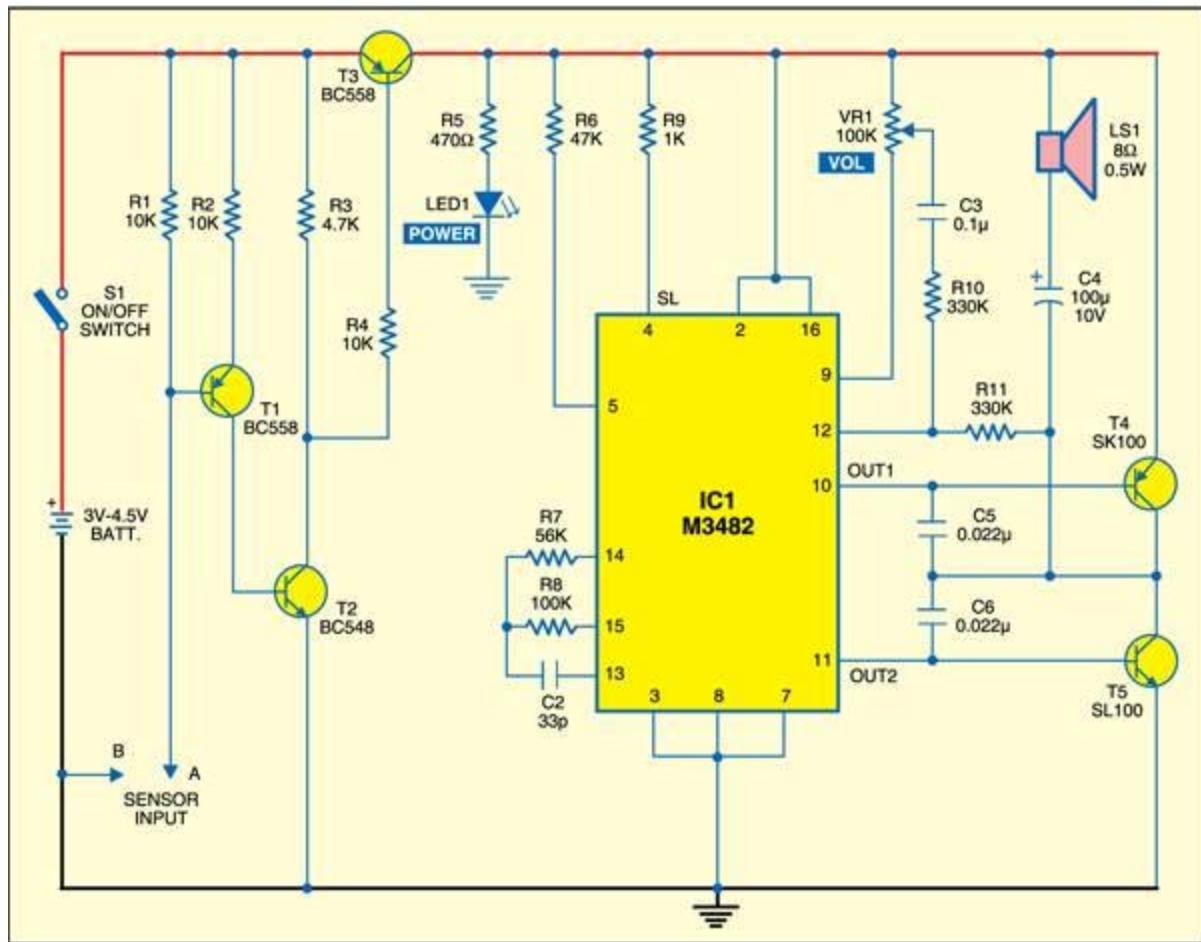
159. 555 Timer PWM Audio Amplifier

The ubiquitous 555 timer IC handles audio signals in its own pulse-width modulation (PWM) way. Here, the 555 IC works in astable mode. The switching frequency can be varied from 65 kHz to 188 kHz. Selection of PWM frequency depends on the amplitude of the input signal as well as the load impedance. By adjusting VR1, you can ensure comfortable listening with low audio distortion [160].



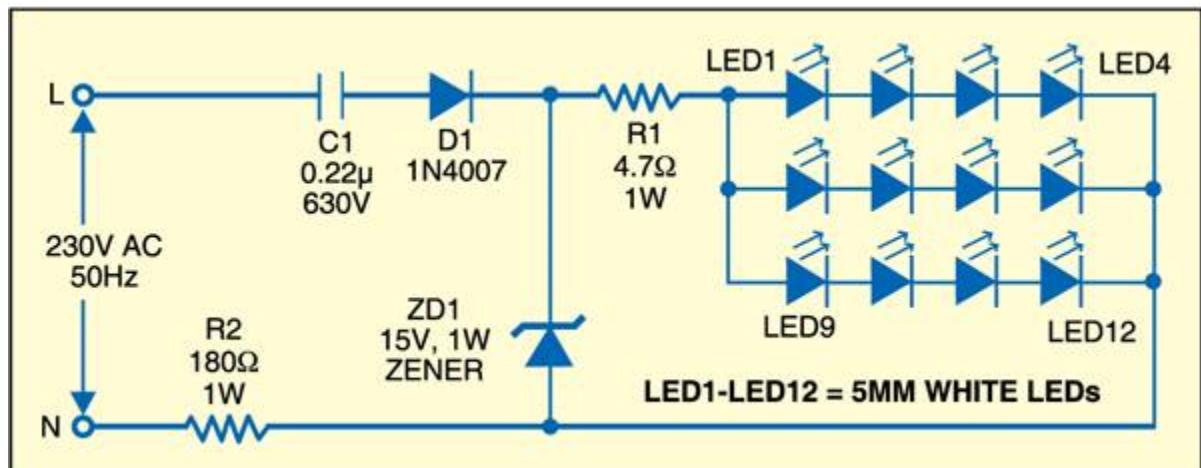
160. Musical Water Shower

Won't it be nice to have music playing in the background all the while when you take a shower? This simple circuit does the same. It plays different tunes repeatedly for as long as your shower is turned on. The music starts as soon as water comes out of the shower. The music stops when you turn the shower 'off' and water stops coming out of it [161].



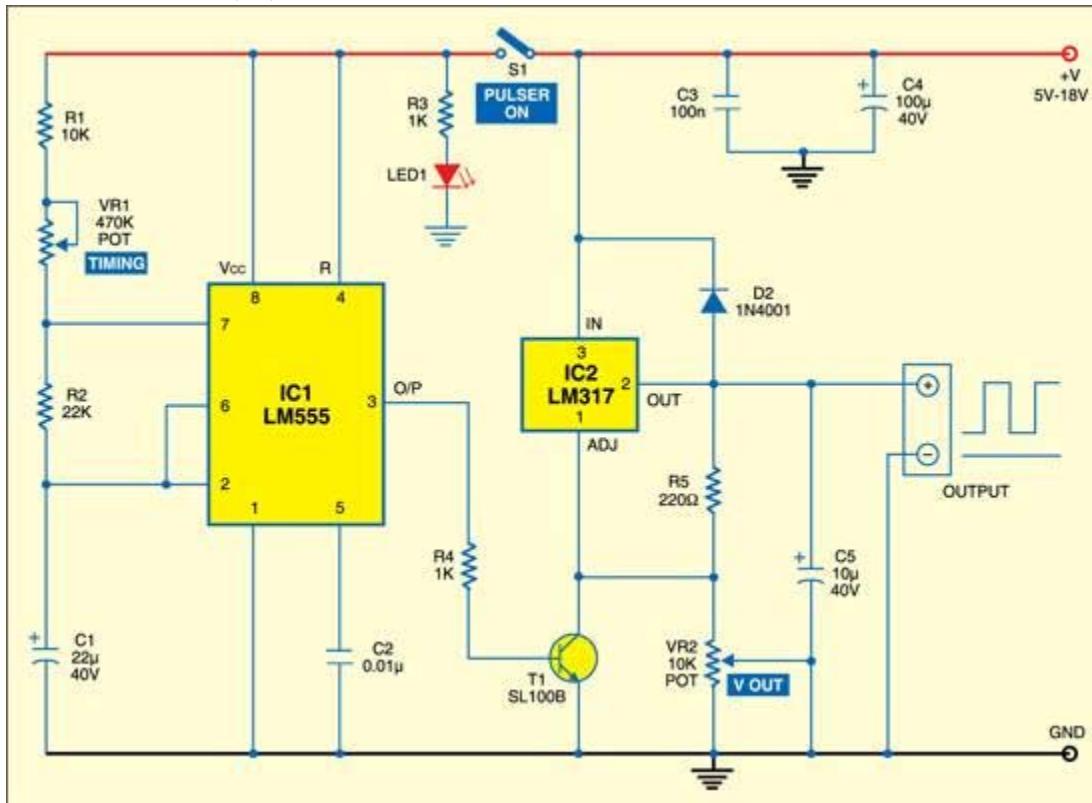
161. Night Lamp

Here are two night lamp circuits using LEDs. One could be used as a night-vision clock and the other as a TV lamp. Both the circuits are AC operated and consume very little power. These are also protected against mains fluctuations. The night-vision lamp uses twelve LEDs arranged in the circular pattern of a wall clock, while the TV lamp uses 24 LEDs in prism format [162].



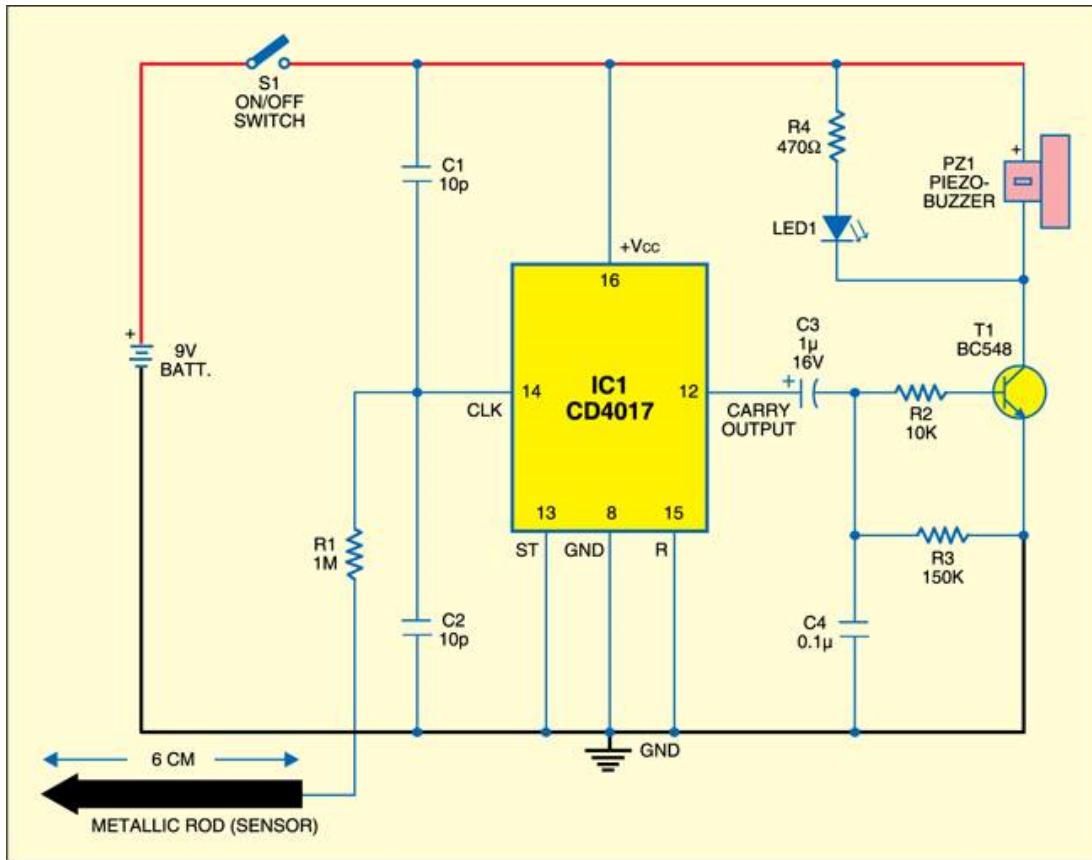
162. Power Pulser

The idea behind this multipurpose power pulser is very simple. As shown in the circuit (Fig. 1), it uses a low-frequency oscillator to drive a voltage regulator. Timer chip LM555 (IC1) is wired as an astable multivibrator. Components R1 and R2, VR1 and C1 produce the free-running frequency. You can adjust it to some extent by varying potentiometer VR1. The output of IC1 at pin 3 controls the switching on/off of adjustable voltage regulator LM317T (IC2) through npn transistor SL100B (T1) [163].



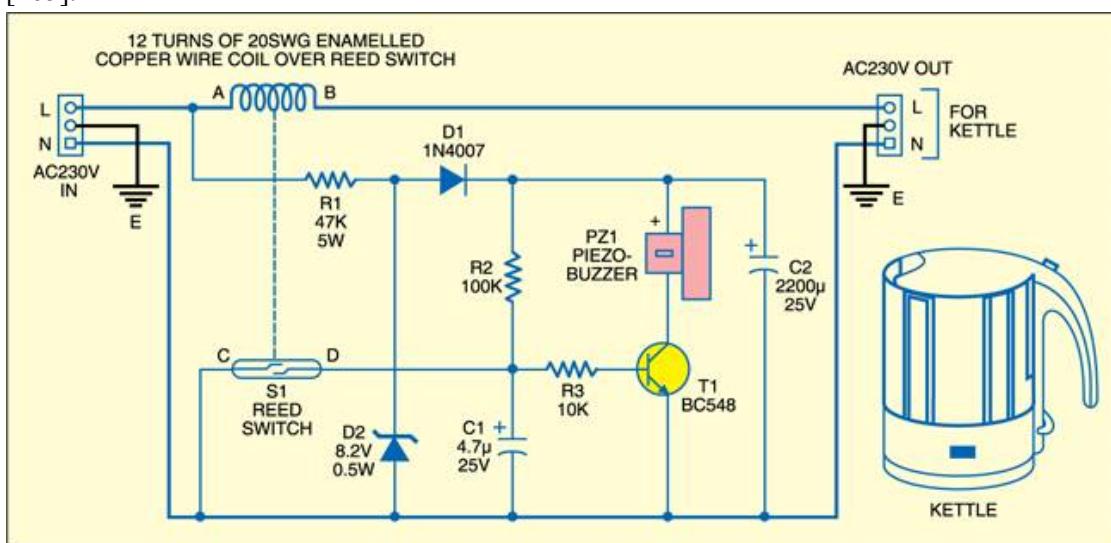
163. Continuity Tester With A Chirping Sound

Today, there's a party at your home. And you are busy detecting faults in the decorative lights hanging over the boundaries of your house. You want to finish the job before evening. But daylight adds to your frustration by making it difficult to observe whether the neon bulb inside the tester is glowing or not [164].



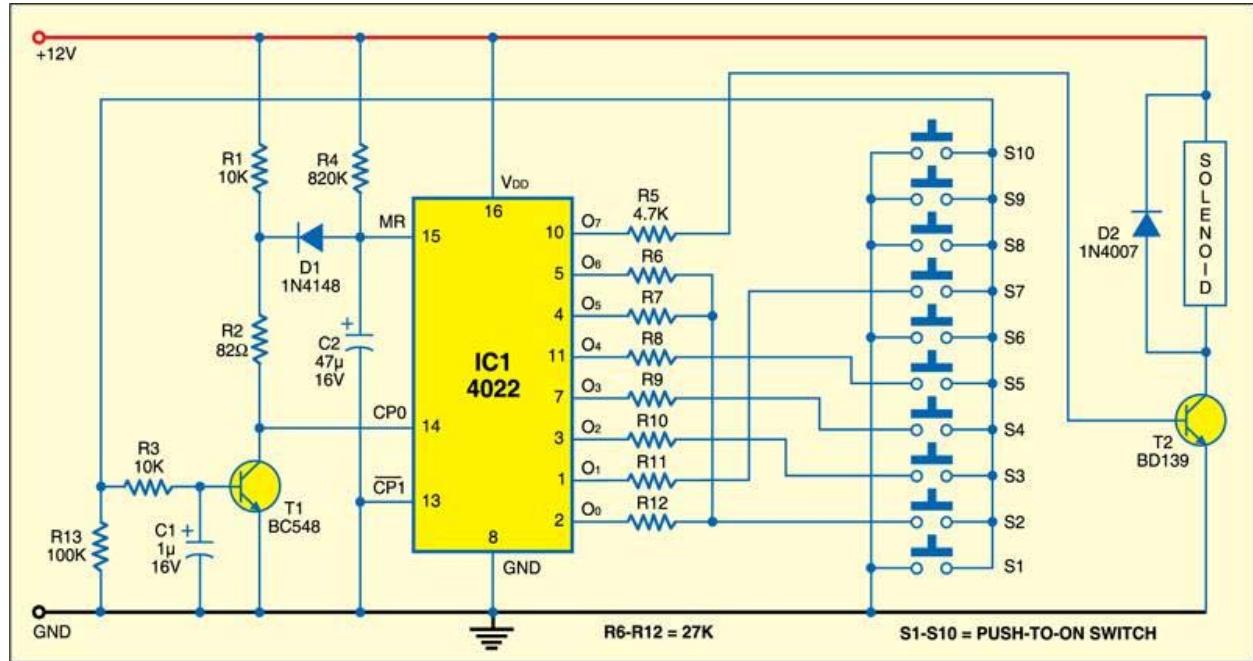
164. Hot-Water-Ready Alarm

Electric kettles turn off automatically when water has boiled. What if the boiler beeps to alert you when your water has boiled? The tripping sound of the thermal switch may not register as an alarm in your mind. Here is such an add-on unit that gives intermittent beeps at the end of boiling. It has the advantages of extremely low component count, low cost, small size and light weight [165].



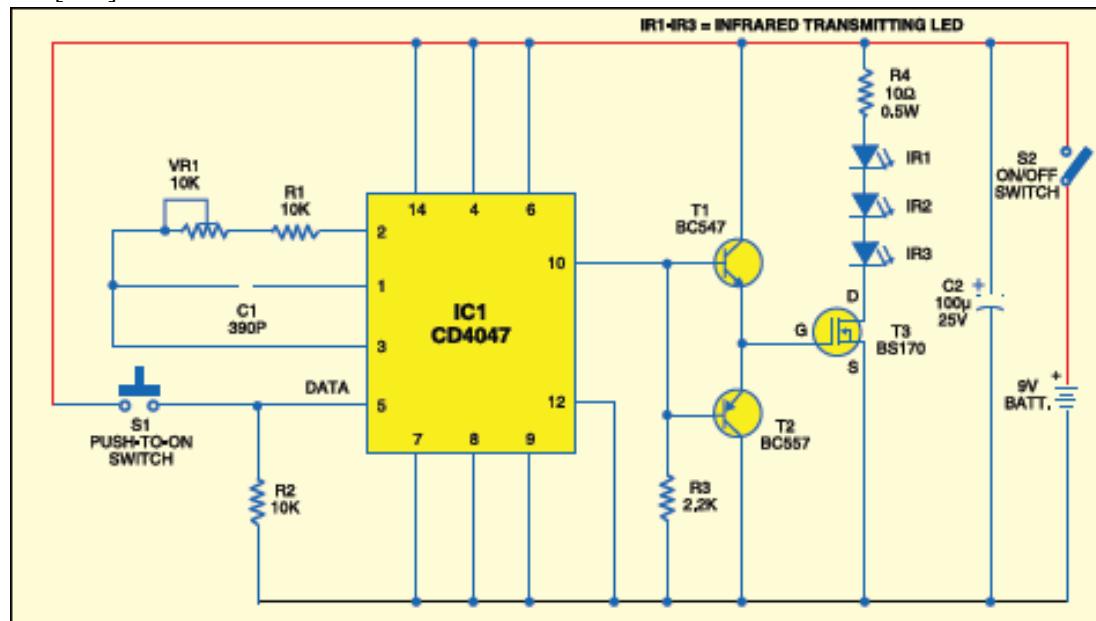
165. Electronic Combination Lock

This 7-digit combination lock can be easily hard-wired for any combination that you choose. The circuit uses a 4-bit, divide-by-8 Johnson counter (IC1), ten pushbutton switches and npn transistor T1 [166].



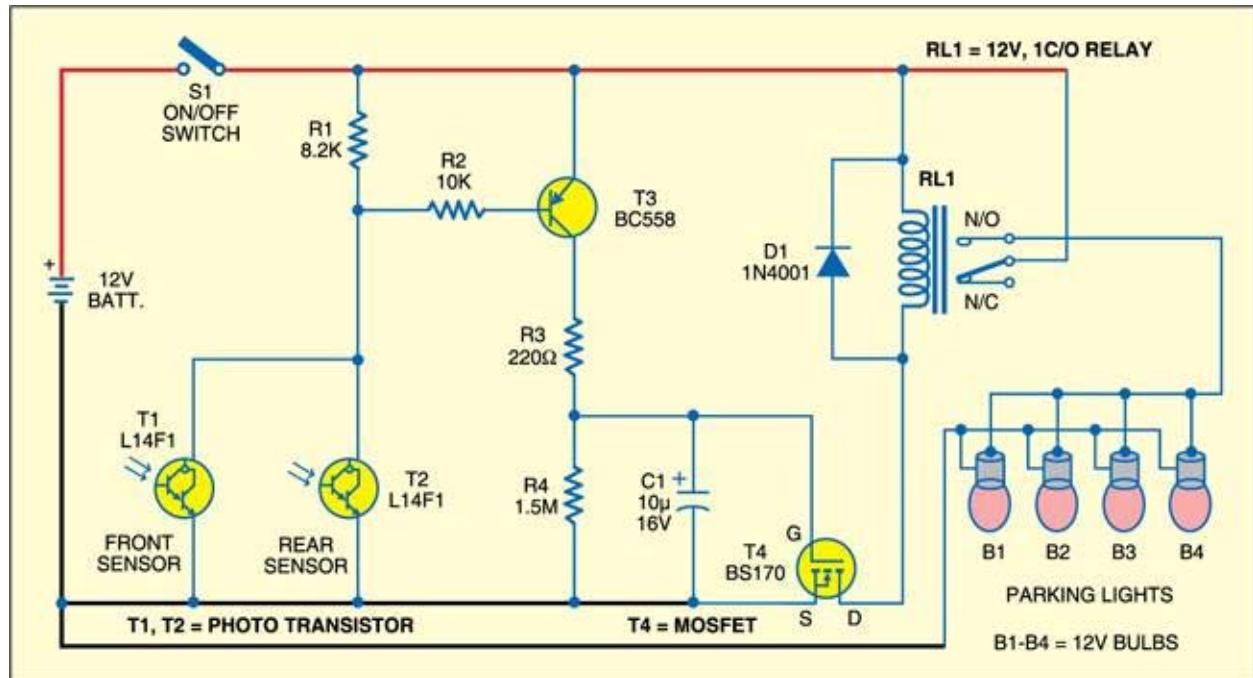
166. Long-Range IR Transmitter

Most of the IR remotes work reliably within a range of 5 metres. The circuit complexity increases if you design the IR transmitter for reliable operation over a longer range, say, 10 metres. To double the range from 5 metres to 10 metres, you need to increase the transmitted power four times [167].



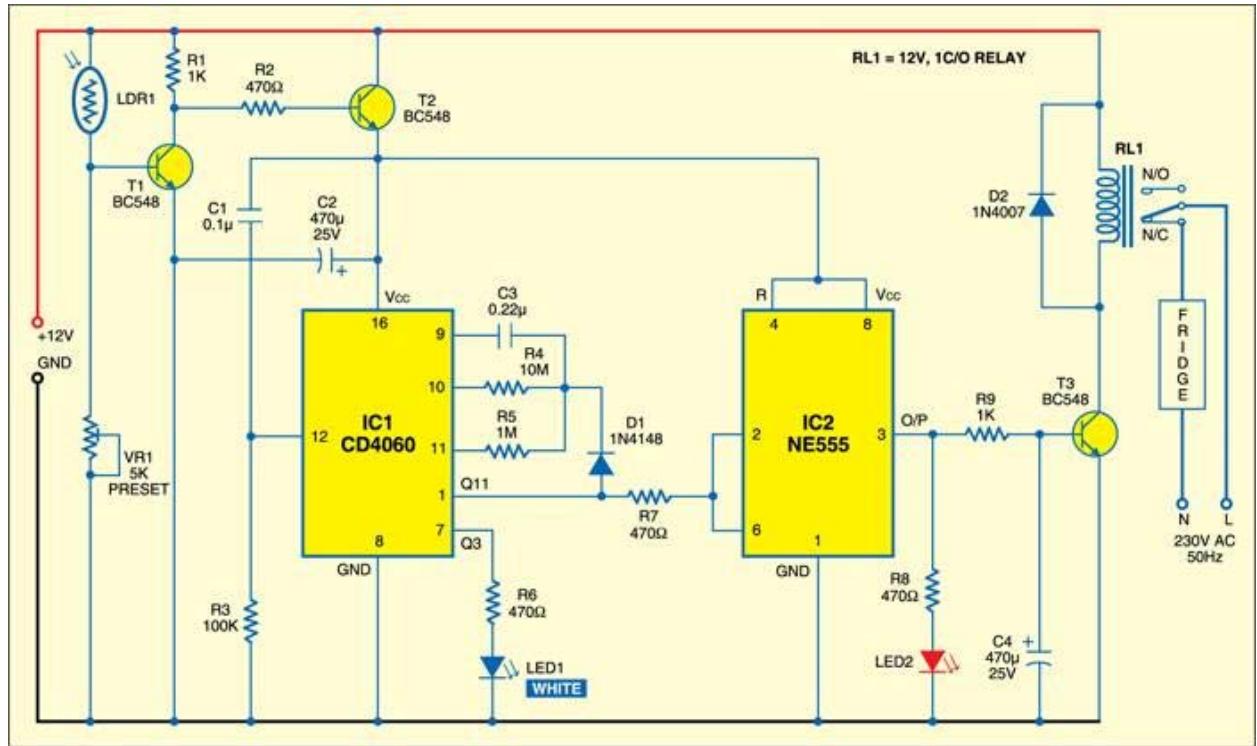
167. Automatic Parking Light For Cars

At night, parking lights make your parked car visible to motorists so they don't smash into your car. However, these lights drain considerable power out of your car's battery. Here is a simple, automatic parking light system that works with zero standby current. The circuit is designed to turn on the parking lights automatically for 30 seconds when an approaching vehicle's light is detected from the rear or front side. This automatic feature provides safety at night for a parked vehicle [168].



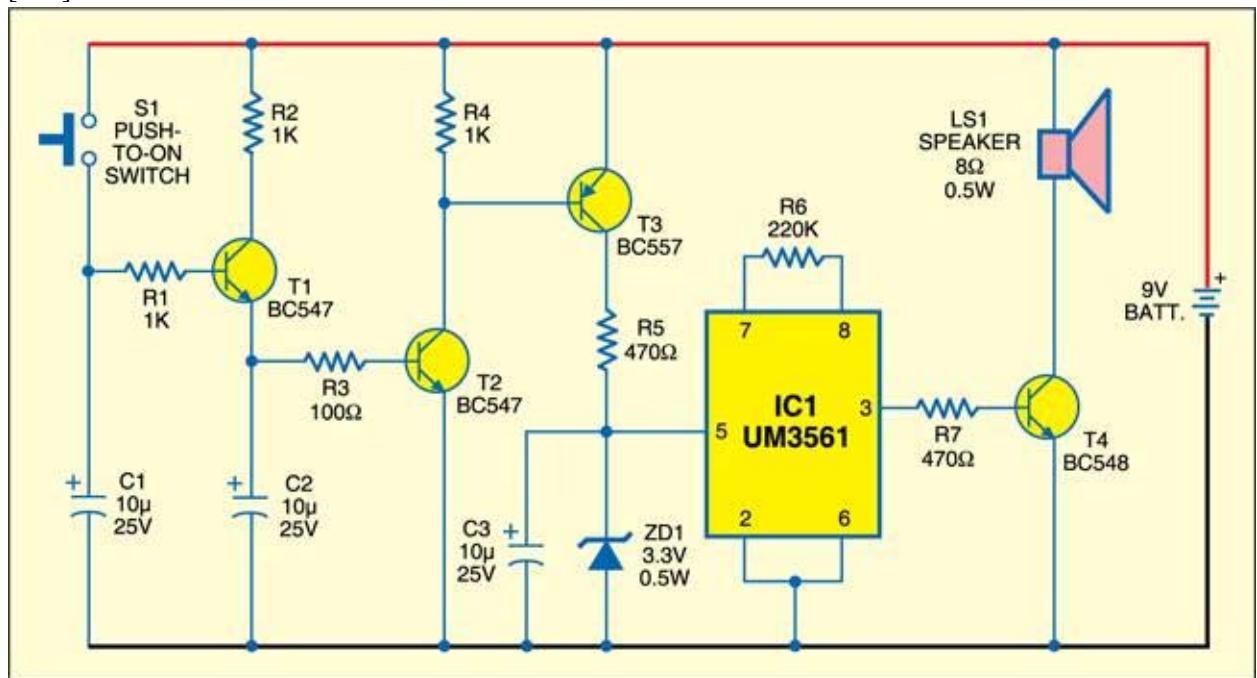
168. Peak Hour Timer

Electrical appliances like refrigerators and air-conditioners consume heavy current if the line voltage drops during the peak hours between 6 pm and 9 pm. If there is no low-voltage cut-off in these appliances, it will cause wastage of current and heating of the appliances. Over-heating may, in turn, reduce the efficiency of the compressors of these appliances [169].



169. Panic Alarm

If you feel threatened or need emergency assistance, simply activate this alarm. It will catch the attention of others for immediate help. The alarm will sound for three minutes and then cease. Especially useful for women travelling alone, it is small enough to pocket or carry in a handbag [170].



Another circuit

Here is a very simple as well as very useful project anti bag snatching alarm, used in bag or suitcase in order to prevent from snatching. The sound produced by anti bag snatching alarm is like police horn to get attention of people when someone attempt to snatch your bag or suitcase.

Circuit Description of anti bag snatching alarm

The heart of this entire circuit anti bag snatching alarm is operational amplifier IC CA3140 (IC1), configured as a comparator. The two inputs (inverting and non-inverting) is given to pin no 3 and 2 of operational amplifier respectively and output is obtained from pin no 6. Here IC2 (timer IC NE555) is used as monostable multivibrator. The timing component of anti bag snatching alarm is R5, VR1, and capacitor C2 with the given value in this circuit diagram lets the time of timer is about 1 minute.

For audio section, IC3 is used as alarm tone generator with an inbuilt oscillator. Finally the output is obtained from pin no 3 of IC3 and amplified by transistor T1 in order to get desire level and lastly fed to loudspeaker for output.

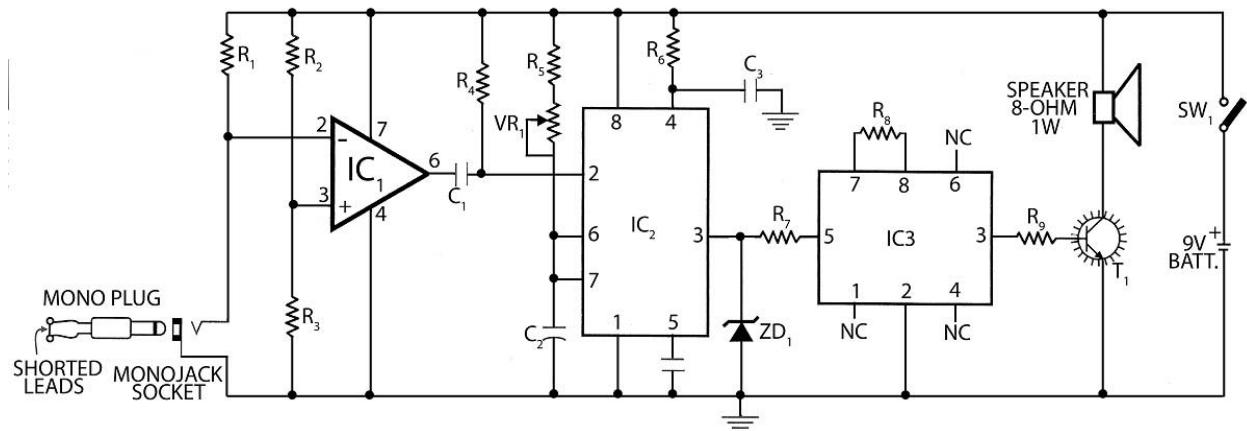


Figure 1: Circuit diagram of anti bag thief alarm

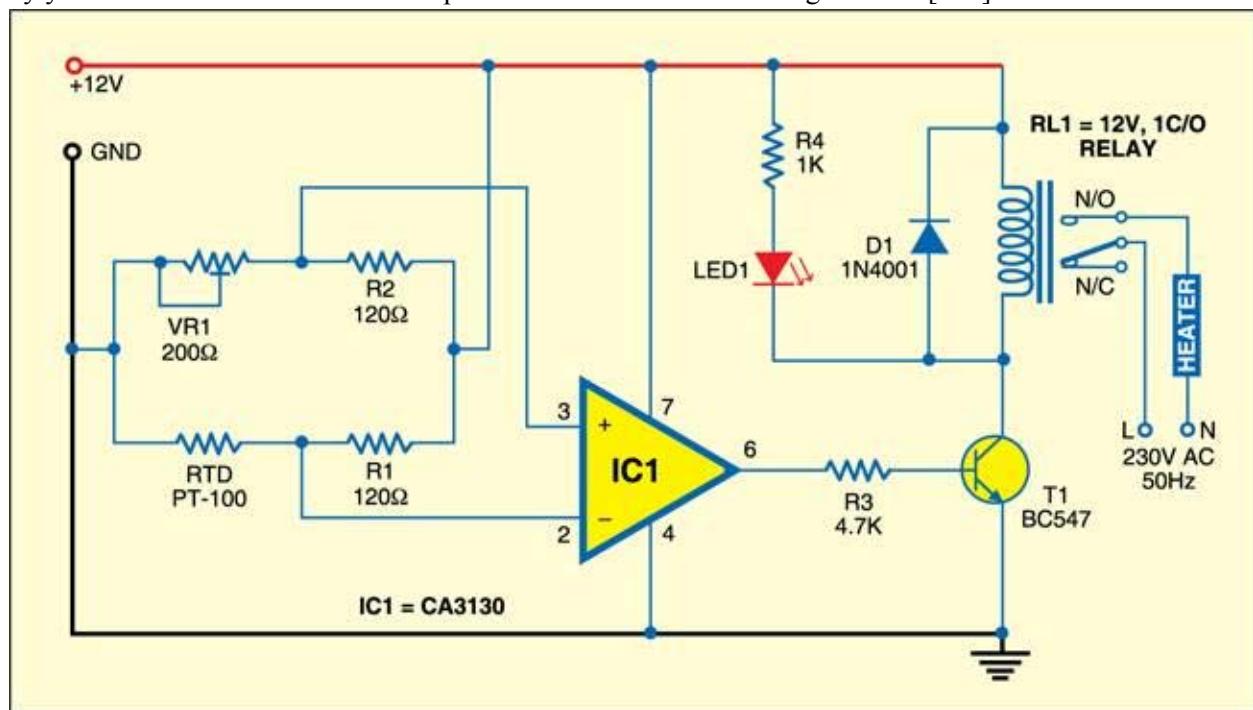
PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1, R2, R3 = 100 K Ω ; R4, R6 = 10 K Ω ; R5 = 10 M Ω ; R7 = 330 Ω ; R8 = 220 K Ω ; R9 = 1 K Ω

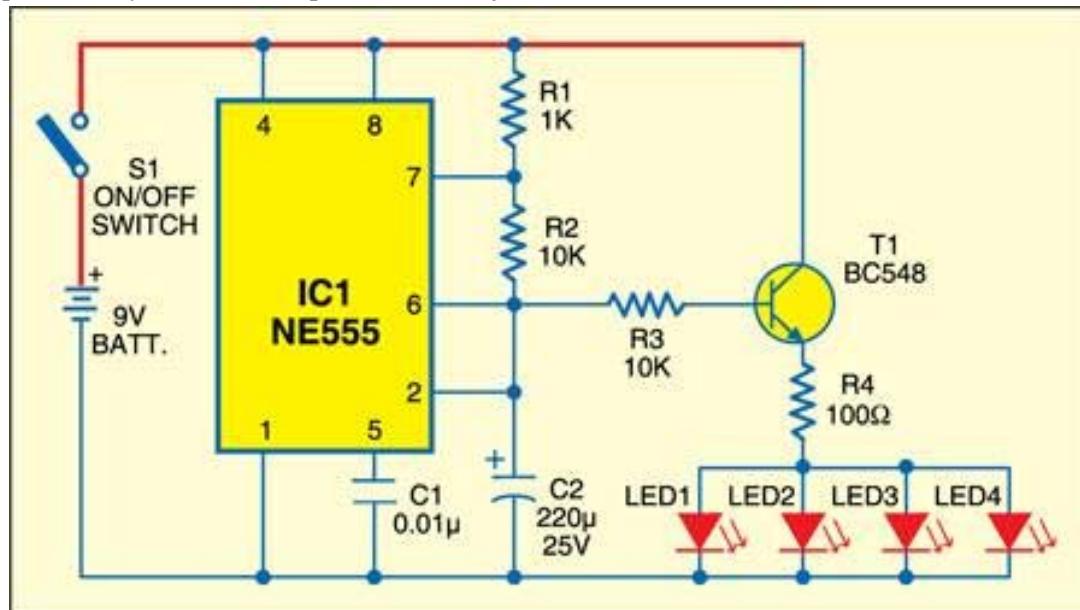
170. Heat Control Unit

This circuit will turn the heater ‘on’ when the temperature of water falls below the lower limit set by you and turn it ‘off’ when the temperature increases above the higher limit [171].



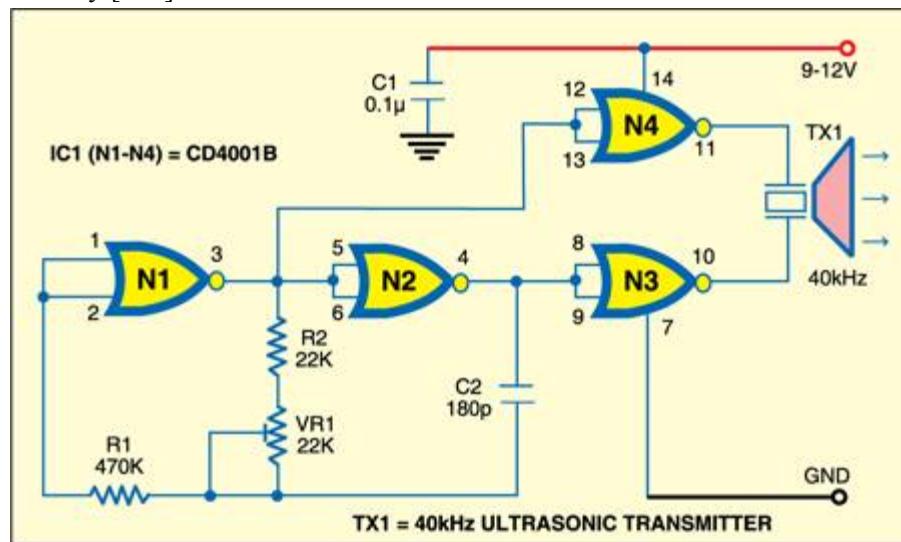
171. Electronic Heart

With this electronic heart glowing on and off, you are sure to steal the heart of that special someone. The circuit uses an NE555 timer wired in astable multivibrator mode. Its frequency of oscillations is determined by resistors R1 and R2 and capacitor C2. Here the frequency is approximately 0.2 Hz. Each period lasts for just a little over 4 seconds [172].



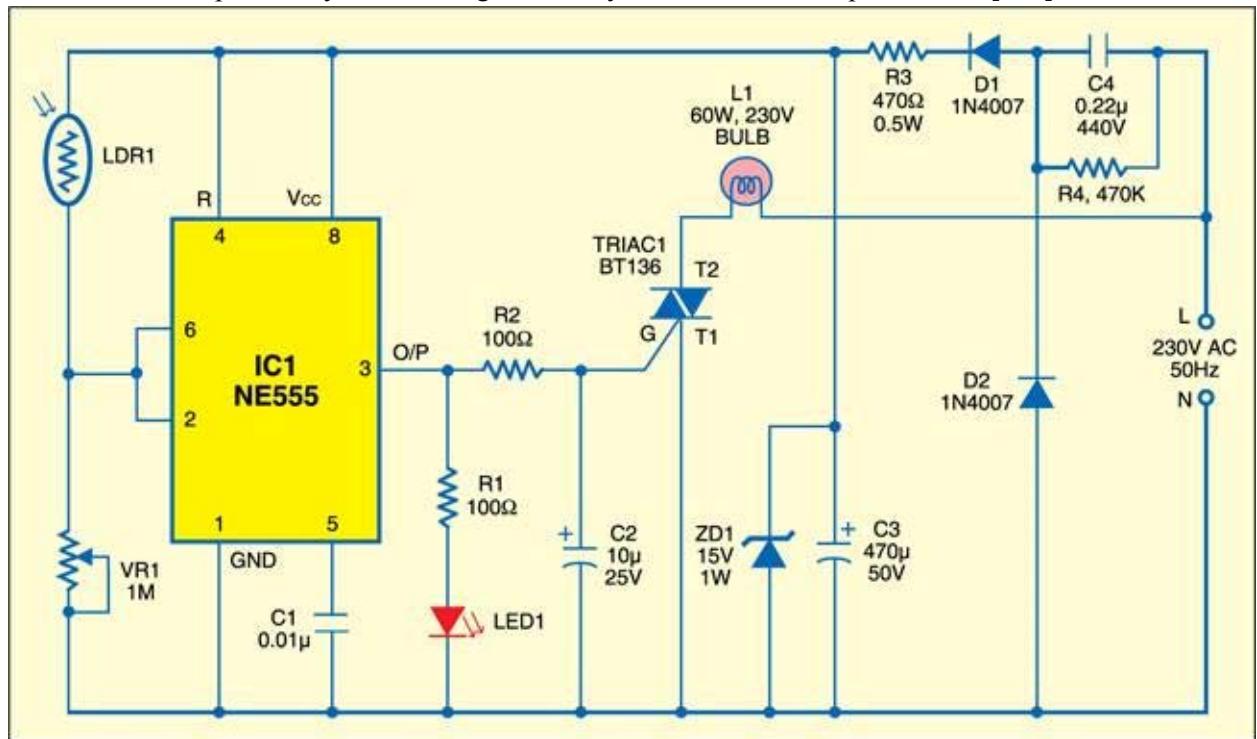
172. Ultrasonic Sound Beam Burglar Alarm

This unique burglar alarm makes use of the invisible, inaudible ultrasonic sound beam to detect movements. Ultrasonic transducers operate at maximum efficiency when driven at 40kHz frequency. So an ultrasonic transmitter and receiver pair operating at 40 kHz is used to control the buzzer or the relay [173].



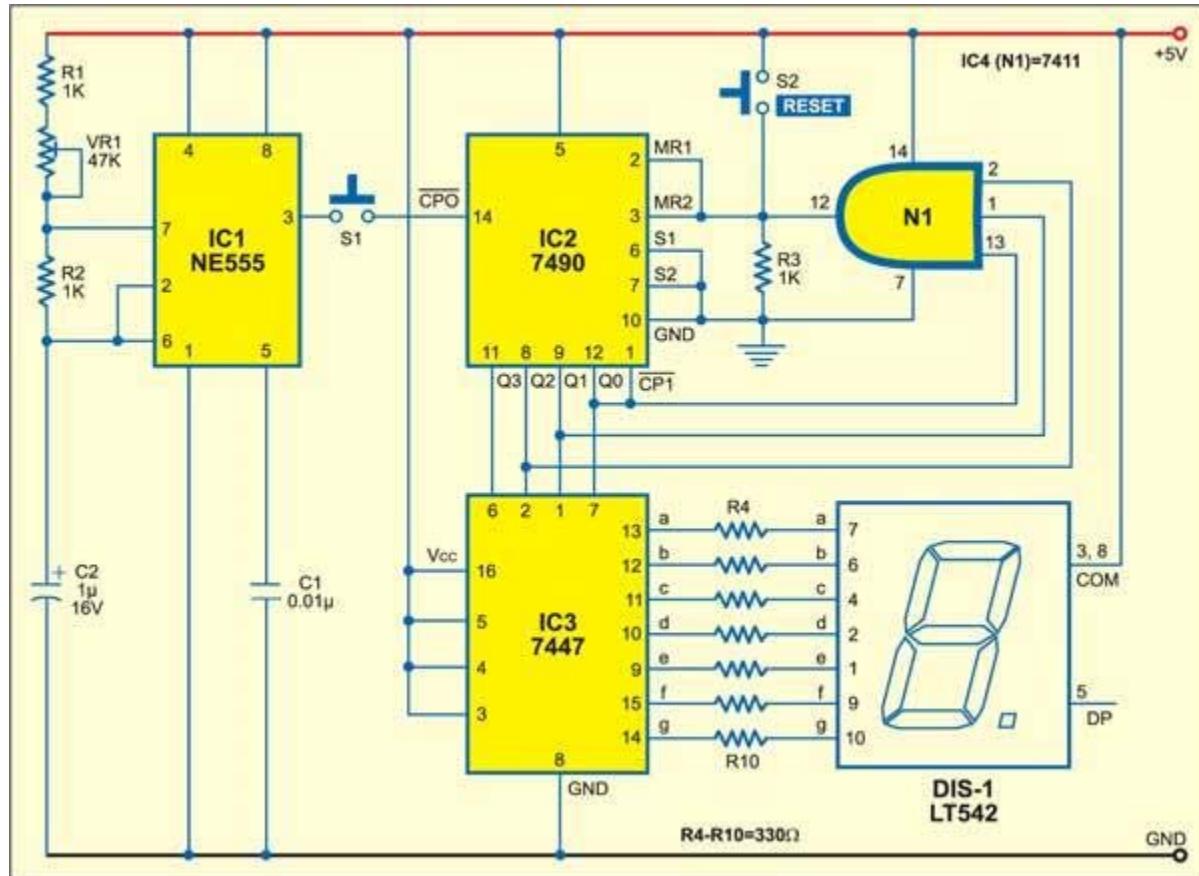
173. Sunset Lamp

LDR-based automatic lights flicker due to the change in light intensity at dawn and dusk. So compact fluorescent lamps (CFLs) are unsuitable in such circuits as flickering may damage the electronic circuits within these lamps. The circuit described here can solve the problem and switch on the lamp instantly when the light intensity decreases below a preset level [174].



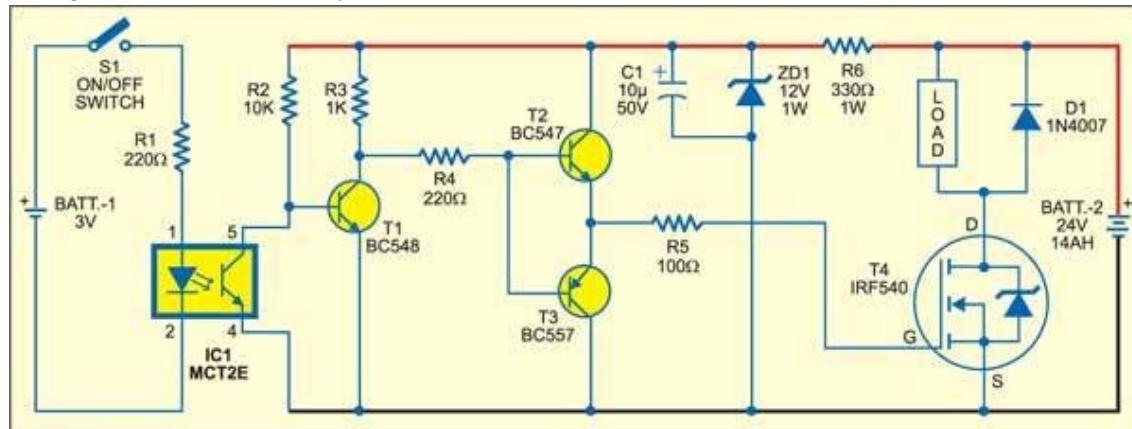
174. Electronic Dice

This electronic dice has no chance of wear and tear but all the features of a wooden or plastic dice used for Ludo game [175].



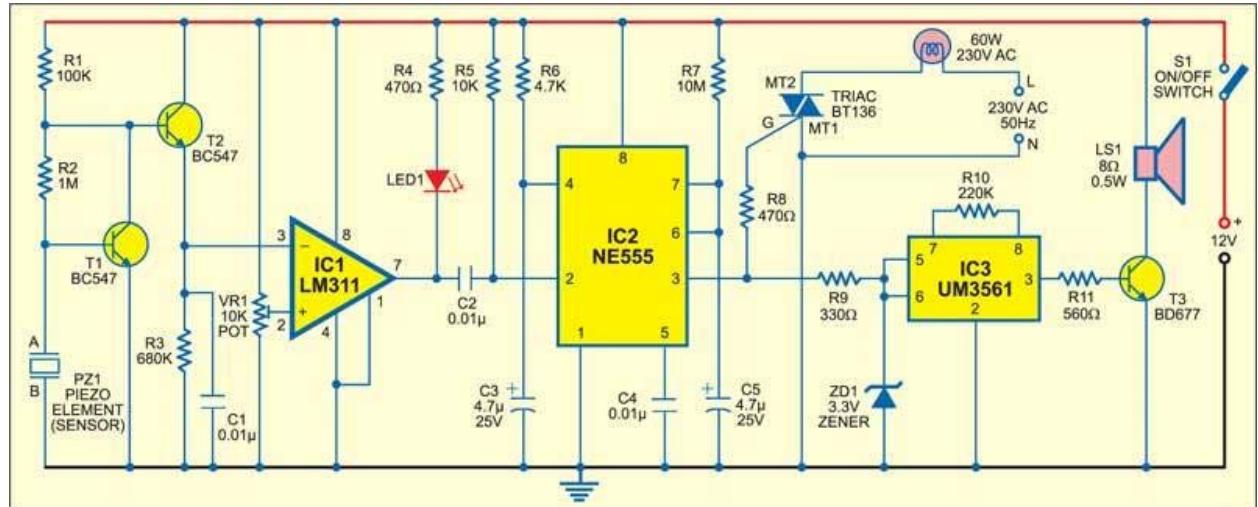
175. Solidstate Relay

The basic function of a relay is to switch on power to a load using an electrically isolated, low-power control signal. Hitherto, electromechanical relays have been the components of choice to perform this function. The advances made in the semiconductor technology have resulted in the emergence of solidstate relays [176].



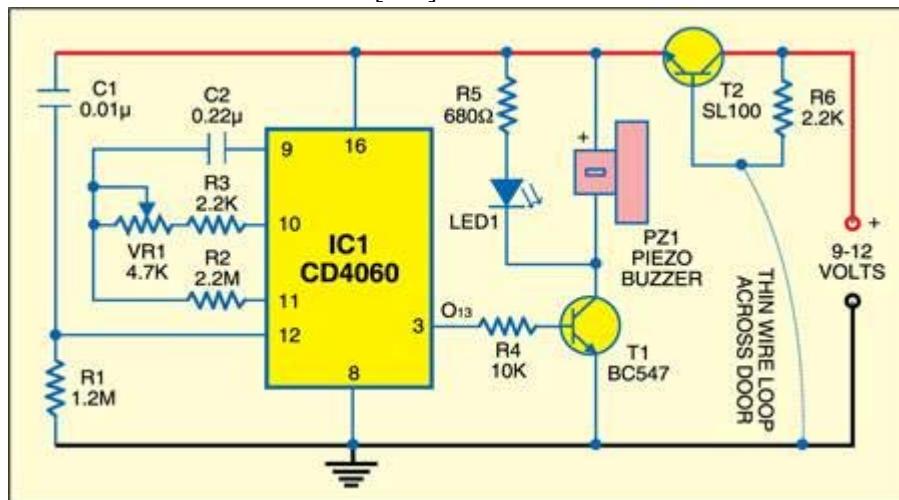
176. Car Porch Guard

Protect your costly vehicle from theft using this electronic safety system. The system immediately switches on the porch lamp and sounds a loud alarm as soon as it detects any attempt of impending theft [177].



177. Wire-Break Alarm With Delay

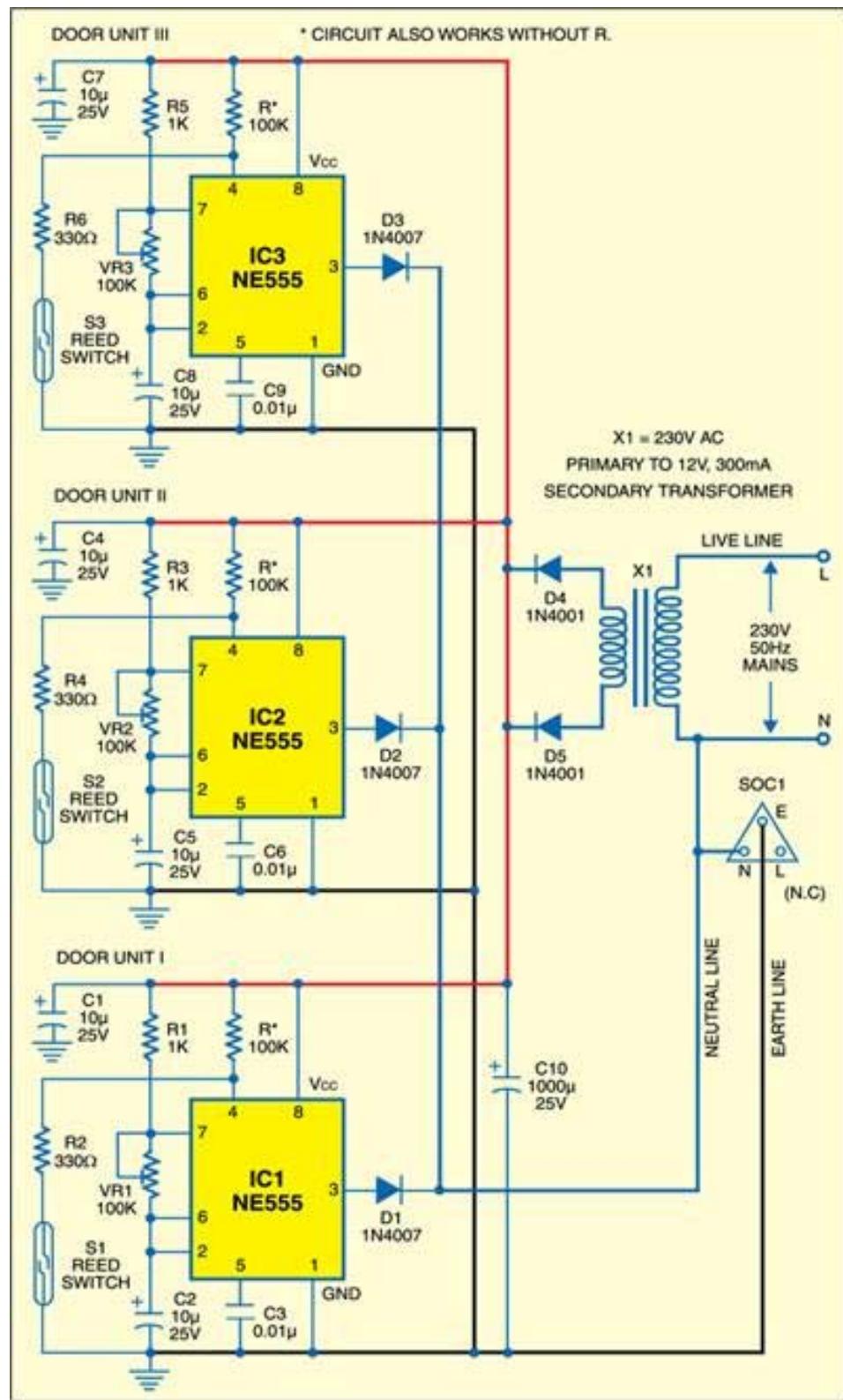
Here is a simple circuit of wire-break alarm that activates after a delay of 15 to 30 seconds. When the thin-wire loop running across the entrance door is broken, the alarm sounds after a delay of 15 to 30 seconds, the time period set through VR1. Thus the occupants get sufficient time to lock the room from the outside and catch the thief [178].



178. Cordless Multidoor Alarm

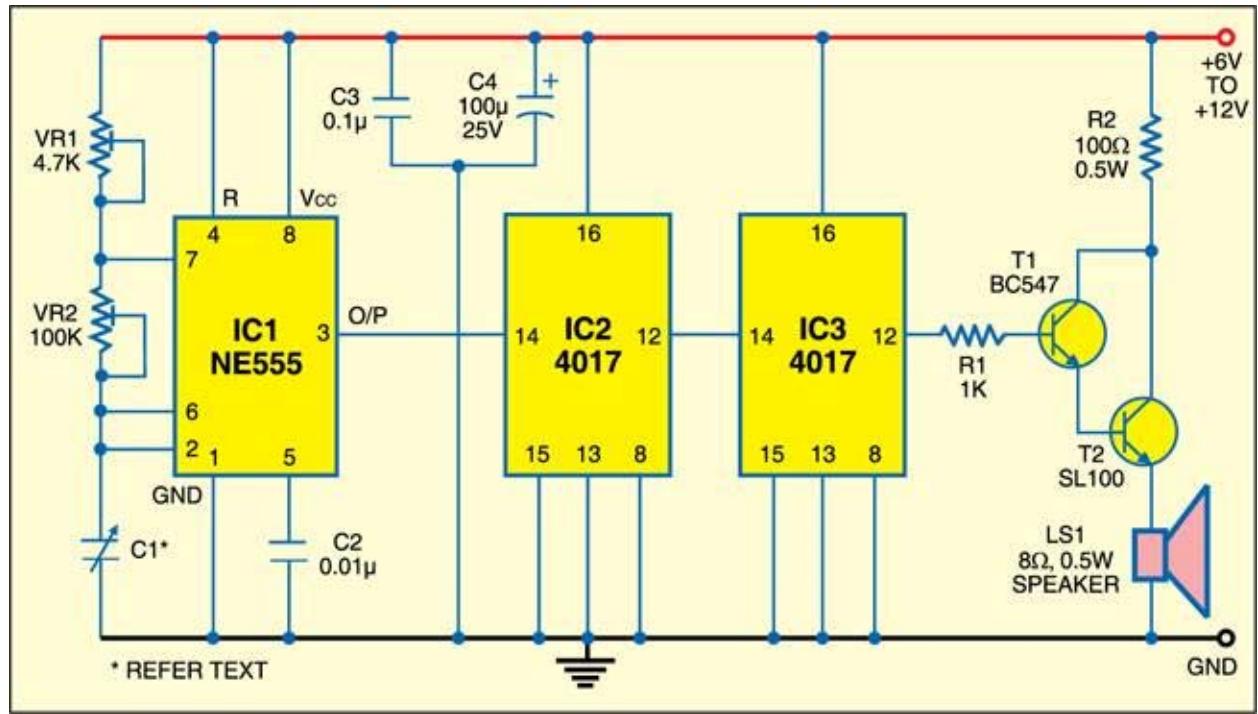
Thwart the attempt of burglary by detecting intrusion with this alarm circuit. Each door is protected by a separate circuit built around an independent 555 timer IC in conjunction with reed switch magnet. All the three units are powered from a single power source. The buzzer can be plugged into the earth line of a socket in any room of the same building having proper earth line

connection. There is no need of laying external wires up to the buzzer unit from different rooms [179].



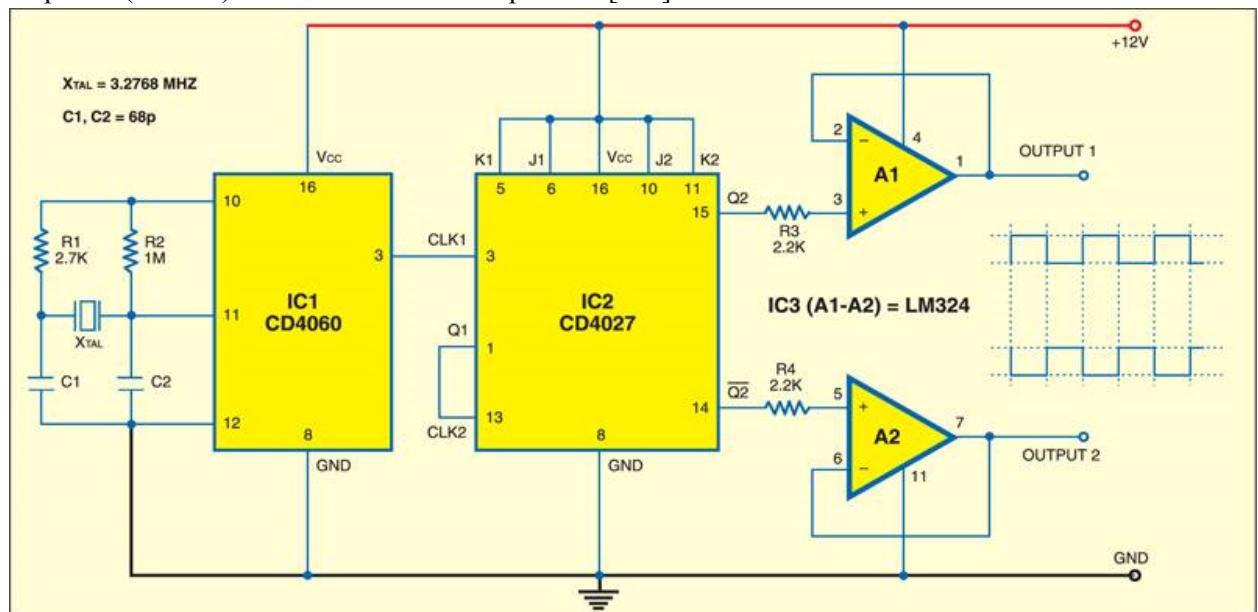
179. Pressure-Sensitive Alarm

Here is a low-cost, pressure-sensitive burglar alarm. The alarm uses a home-made pressure sensor, which works as a variable capacitor using two copper-clad boards and a piece of sponge in between them [180].



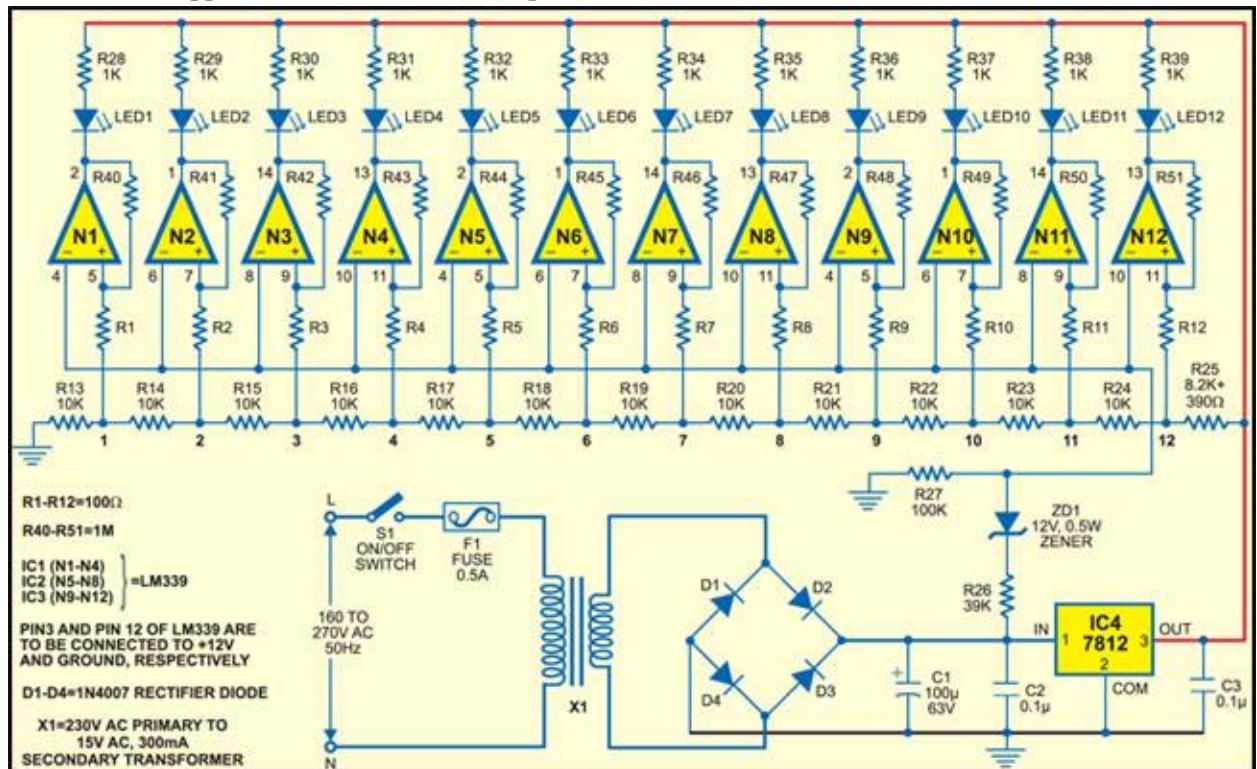
180. Crystal-Based 50Hz Generator

Here is a simple oscillator circuit that generates 50Hz frequency using a crystal. It produces alternating 50Hz pulses with 50 per cent duty cycle, which can be used in inverter circuits. It comprises a 14-stage counter and oscillator (CD4060), dual J-K flip-flop (CD4027), operational amplifier (LM324) and a few discrete components [181].



181. VISUAL AC MAINS VOLTAGE INDICATOR

You should not be surprised if someone tells you that the mains voltage fluctuation could be anywhere from 160 volts to 270 volts. Although majority of our electrical and electronics appliances have some kind of voltage stabilisation internally built-in, more than 90 per cent of the faults in these appliances occur due to these power fluctuations [182].



Another circuit

Here is simple and very useful circuit AC mains voltage indicator, indicates the voltage level of AC mains by three different LEDs. AC mains voltage indicator circuit can be made and assemble even by beginners.

Circuit description of AC mains voltage indicator

All three LEDs of AC mains voltage indicator are connected between collectors of transistors T1, T2, T3 respectively. Here potentiometer VR1, VR2, and VR3 are used to adjust the base voltage of transistor T1, T2 and T3 respectively. As shown in circuit diagram first AC mains is stepped down by 9V-0-9V transformer and then rectified by a signal diode D1 and smoothed by C1 which give output 25V DC. This circuit is work on the principle, when AC mains vary DC voltage also varies proportionally and sensed by transistor T1 through T3.

For setting the low level voltage, a manual AC voltage regulator (MVR) should be connected to the primary of transformer X1. Now set AC voltage of MVR to about 175V and slowly potentiometer VR1 adjusted until voltage across the base of transistor T1 reaches 9.7V and transistor starts conducting which glow LED1 and stop glowing when

the base voltage drops below the preset value. This process is repeated for 200V and 230V in which LED2 and LED3 glows respectively.

Now connect this circuit to AC mains, if the voltage drop below 175 volts no LEDs glow. First, a high voltage (more than 230V) is indicated by all three LEDs glows (LED1, LED2, LED3). Second, normally voltage (200V-230V) is indicated by two LEDs (LED1 and LED2). Third, a low voltage (175V-200V) is indicated by the glowing of LED1 only.

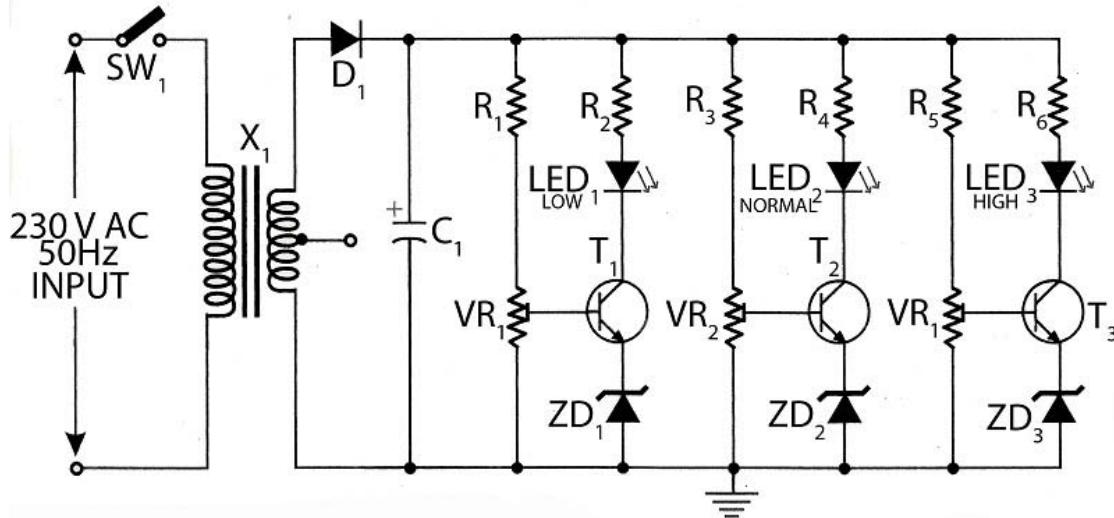


Figure 1: Circuit Diagram of Mains Voltage Indicator

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1- R6= 1 K Ω ; VR1 – VR3 = 10 K Ω

Capacitor C1 = 220 μ F/50V

Semiconductors

T1 – T3 = BC547

ZD1 – ZD3 = 9.1V zener diode

D1 = 1N4001

LED1 – LED3 = Simple LED

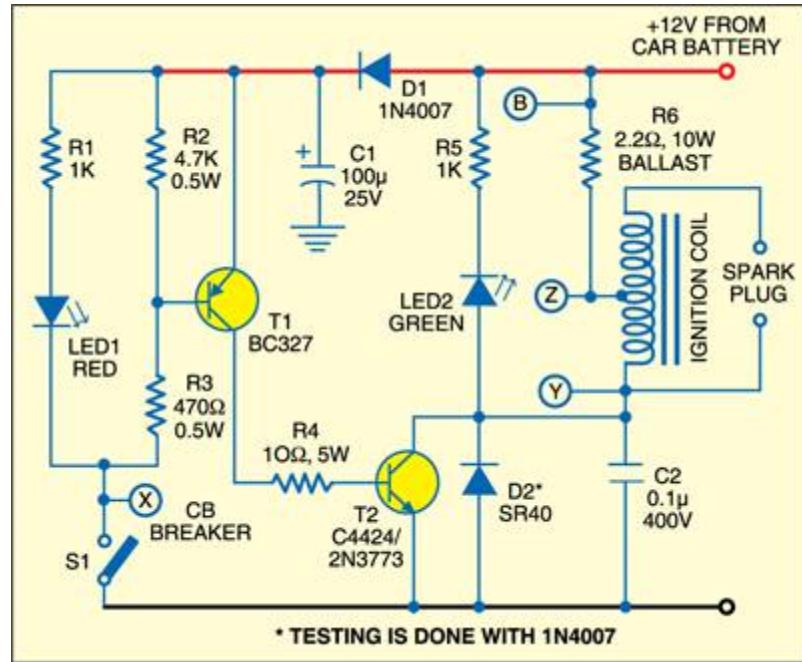
Miscellaneous

X1 = 230V AC primary to 9V-0-9V, 250mA secondary transformer

SW1 = On/off switch

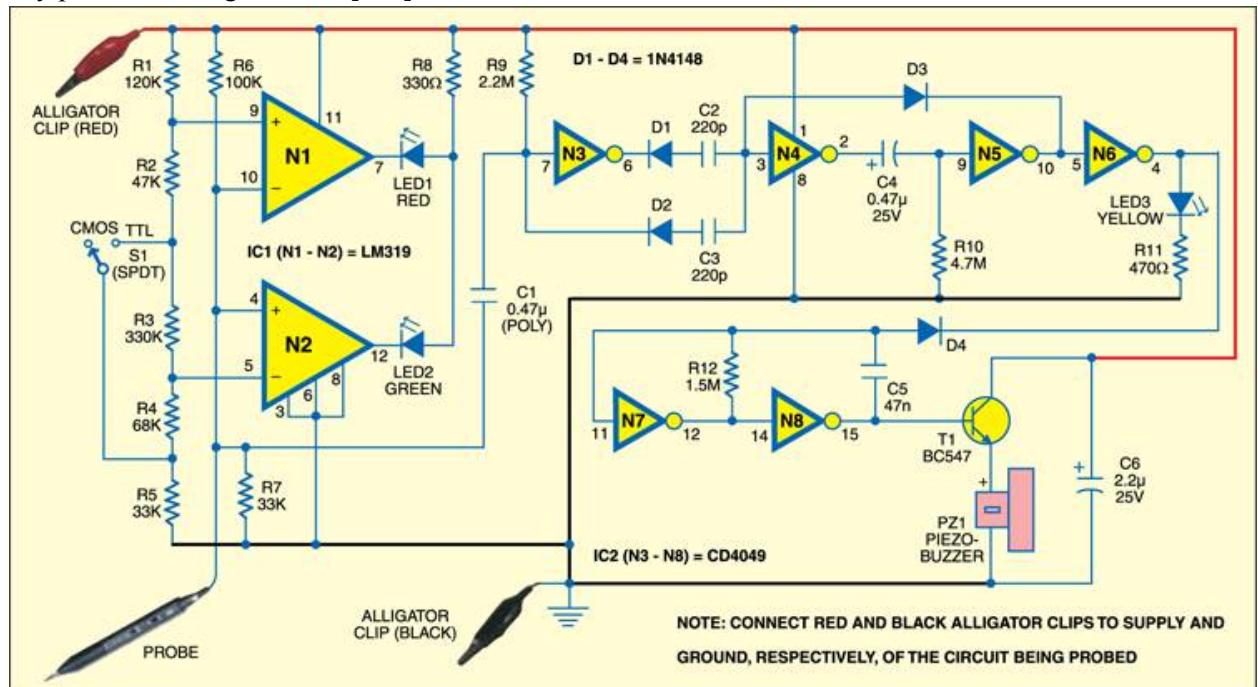
182. Ignition for Old Cars

In older carbureted cars, the contact-breaker (CB) point ignition system is used to fire the spark plugs. You can convert the ignition system of your car from CB-point-cum-condenser type into electronic using transistorised switching [184].



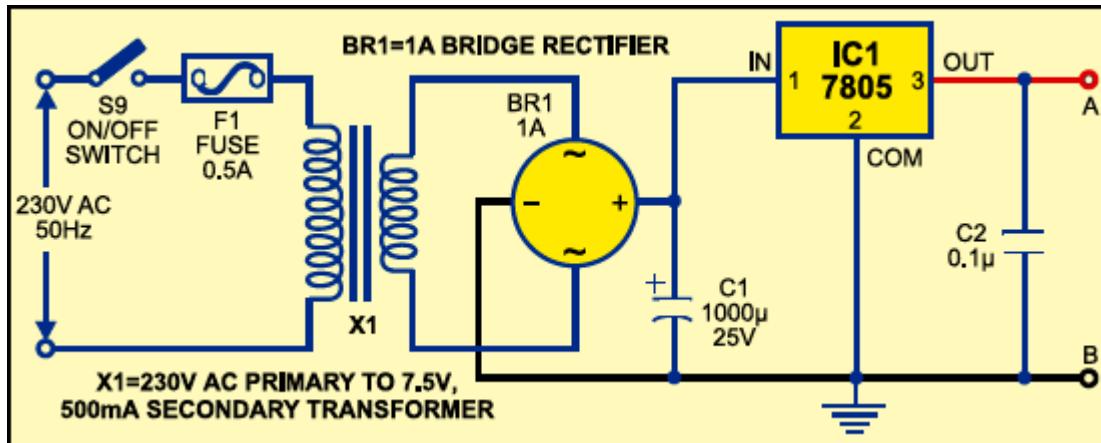
183. Versatile CMOS/TTL Logic and Clock Probe

For fault diagnosis of any logic circuit, you need a probe that can test the logic level or existence of clock activity. The circuit shown here can be used to test CMOS and TTL logic circuits for logic states and also for the presence of clock activity from a few hertz to more than 10 MHz, at any point of the logic circuit [184].



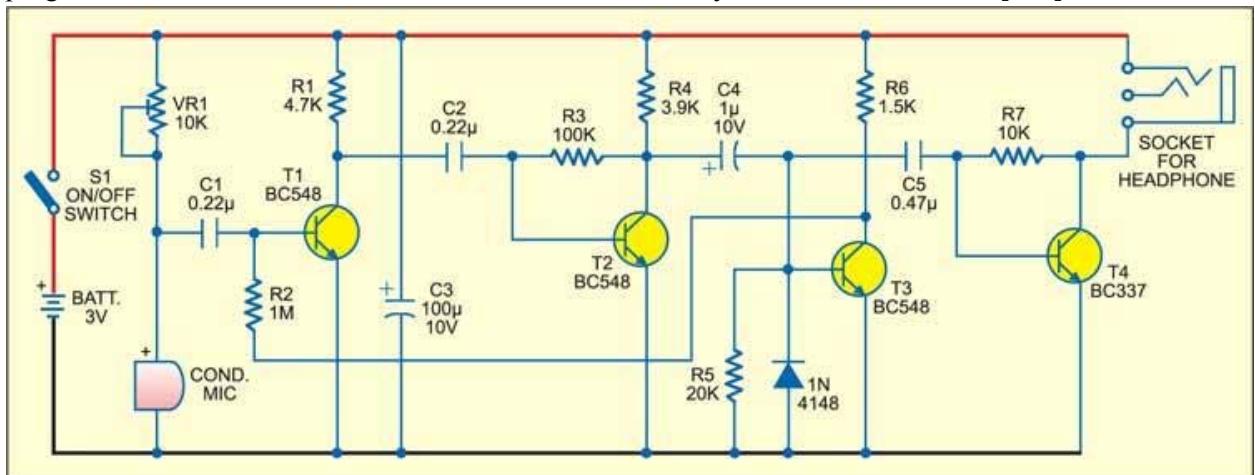
184. School/College Quiz Buzzer

Manual buzzers used for quiz competitions in schools and colleges create a lot of confusion in identifying the first respondent. Although there are circuits using PCs and discrete ICs, they are either too expensive or limited to only a few number of players [185].



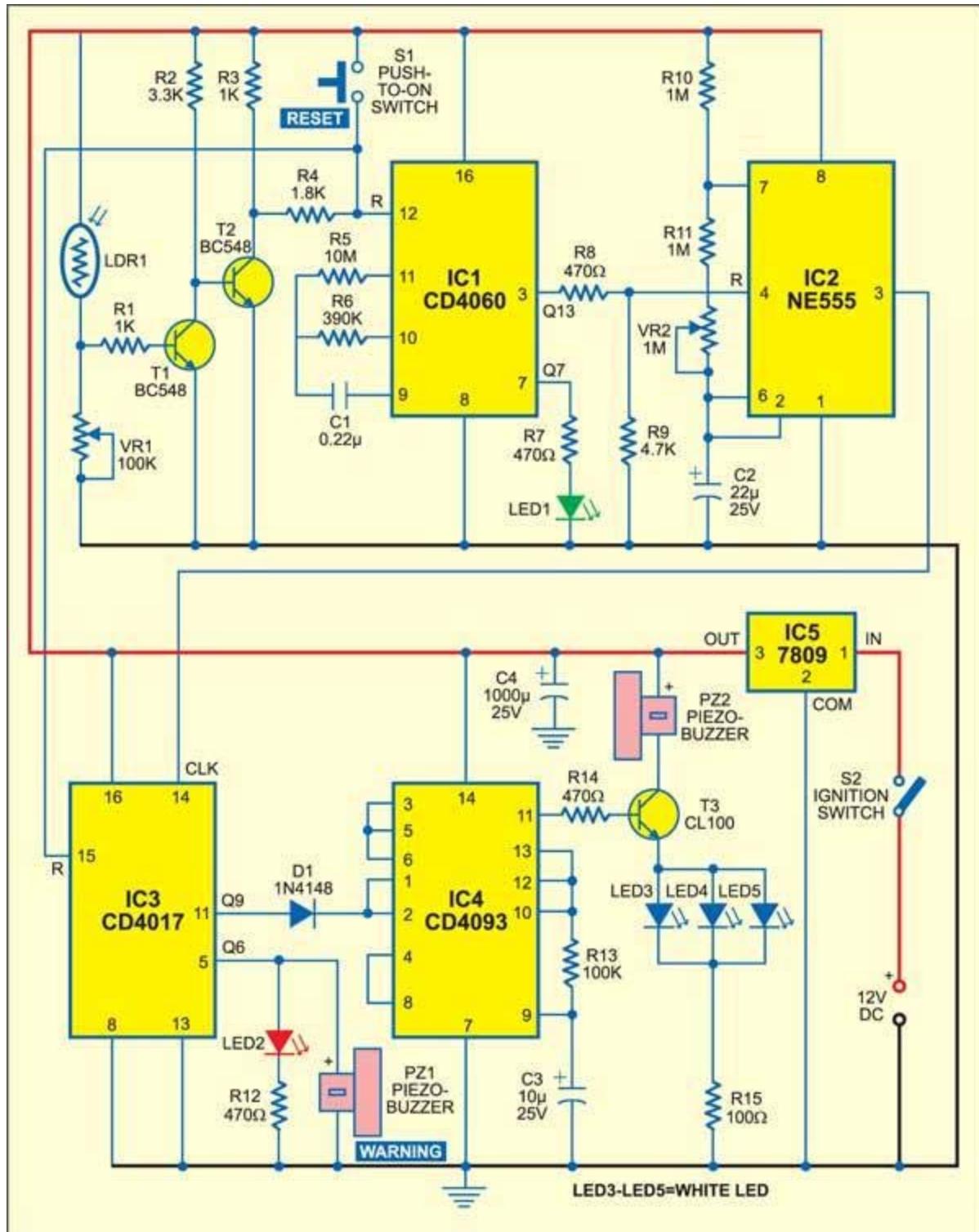
185. Multipurpose listening device

This circuit can detect very faint, remote sounds with a good clarity. It is useful in large conference halls, auditoria, cinema halls, lecture rooms in colleges, etc. The circuit can be housed in a small plastic box and kept in a shirt pocket. It is especially useful for watching TV programmes at a low volume so as not to disturb other family members in the house [186].



186. Anti-Sleep Alarm

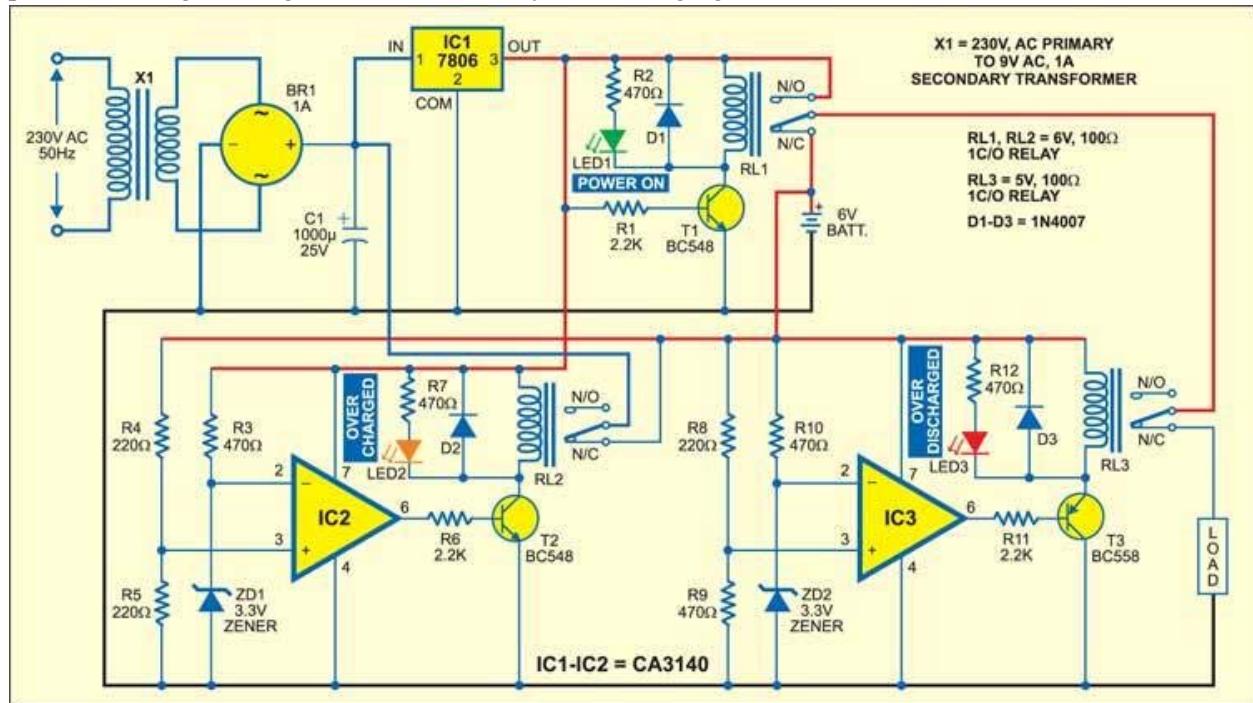
Most of the accidents on highways during night occur due to drivers' poor vision caused by the continuous exposure of their eyes to the bright light from the headlamps of approaching vehicles. The poor vision is due to exhaustion of the visual pigment in the eyes, which induces sleep to restore the pigment [187].



187. DC Changeover System with Battery Protection Unit

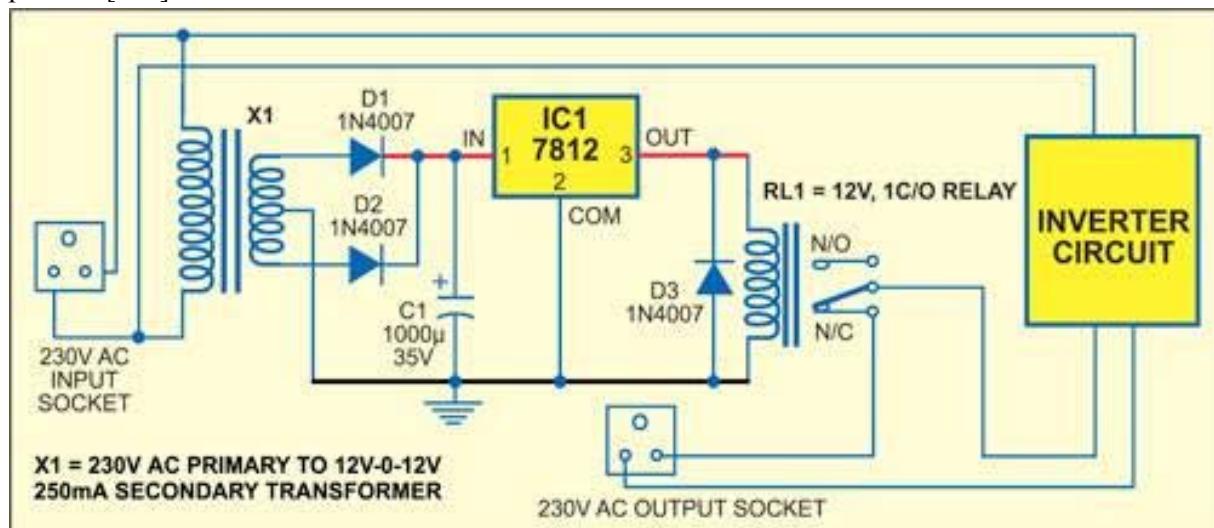
Emergency lights commonly available in the market come with battery over-charging protection but no discharging protection. Here is a circuit that protects the battery from over-charging as well as over-discharging. The load is powered by the regulator when mains is available and

automatically shifts to DC when mains power fails. When mains power resumes, the load is again powered through the regulator and the battery starts charging [188].

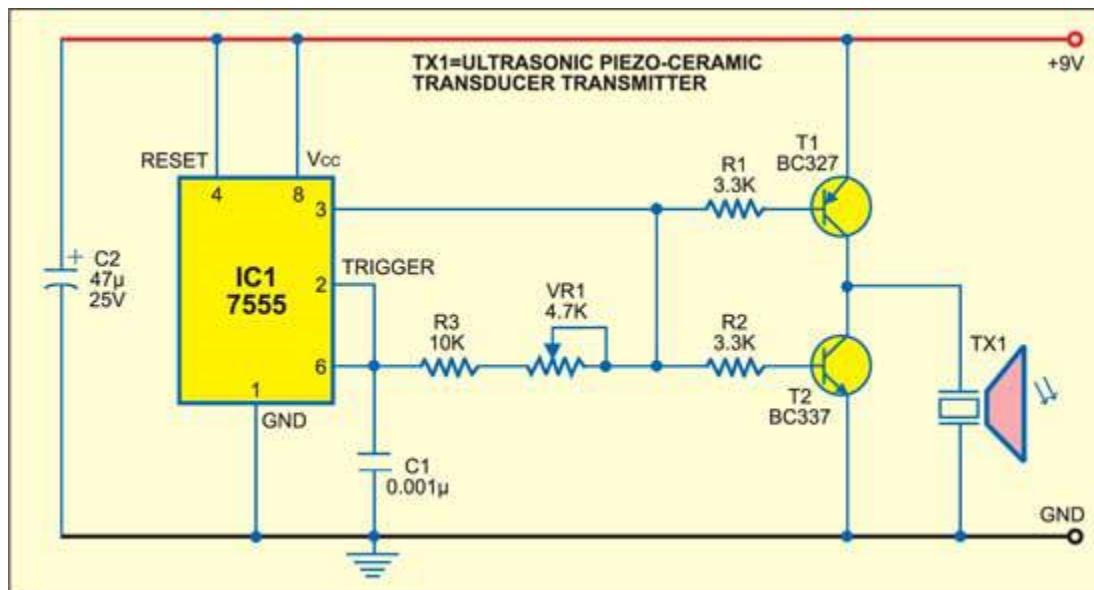


188. Ultrasonic Proximity Detector

This ultrasonic proximity detector comprising independent, battery-powered transmitter and receiver sections makes use of a pair of matched ultrasonic piezoceramic transducers operating at around 40 kHz each. This circuit can be used in exhibitions to switch on prerecorded audio/video messages automatically when a visitor evincing interest in a product comes near an exhibited product [189].

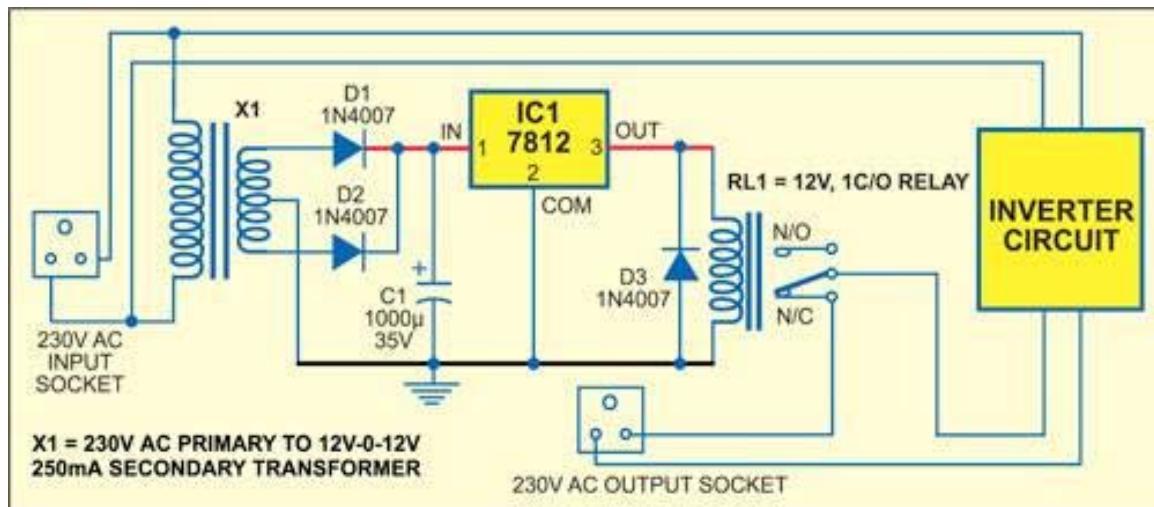


189. Another Ultrasonic Proximity Detector circuit [190]



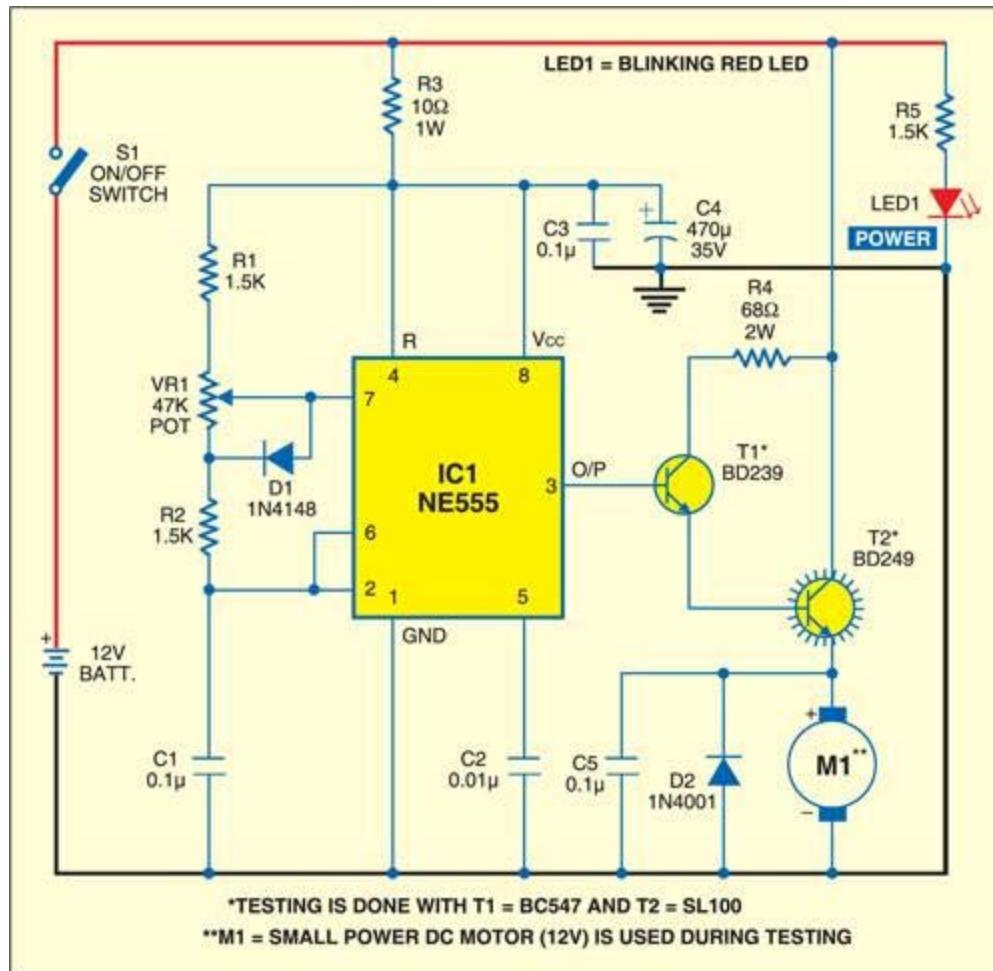
190. Turn Your Old Inverter Into An Emergency Power System

An inverter turned into emergency power system, which turns on when the mains supply fails, and more importantly doesn't turn on when the main supply is available [191].



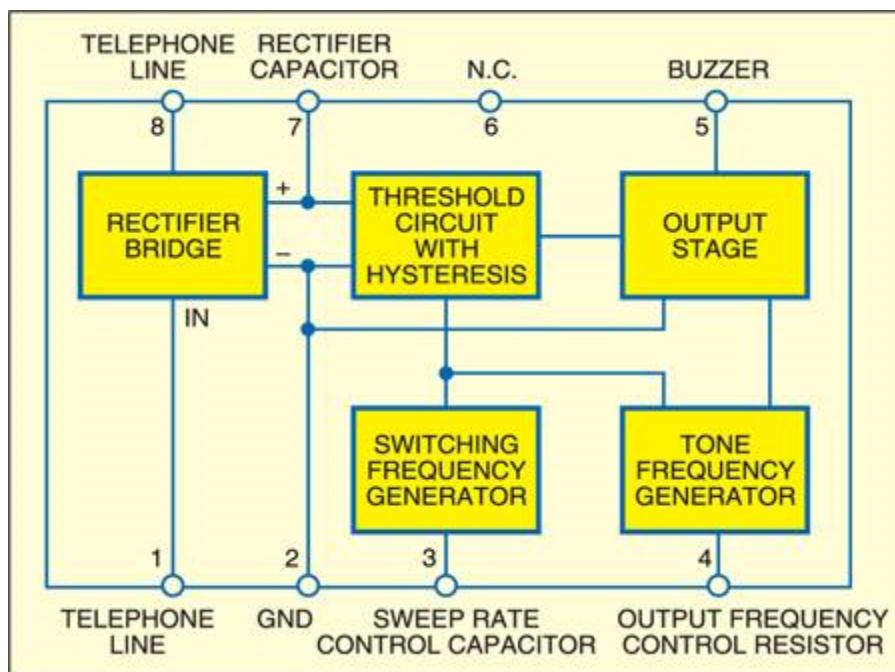
191. Speed Controller for DC Motor

Here is a simple circuit to control the speed of a DC motor. It can be configured to control the sweep rate of automobiles' windscreens wiper [192].

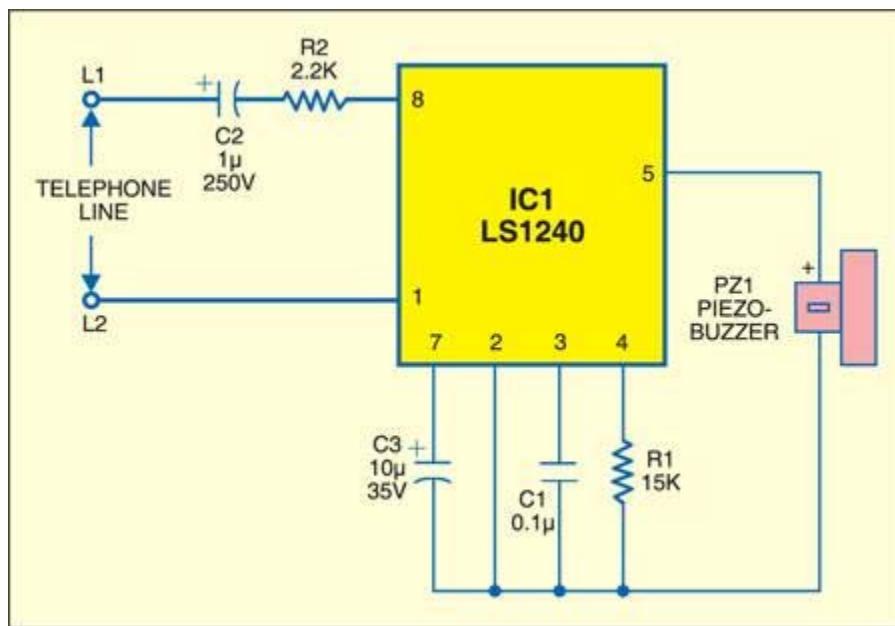


192. Line-Powered Two-Tone Ringer

Need often arises for having an extra telephone ringer in another room to alert you of an incoming call. A low-cost, 2-tone ringer IC LS1240, which is commonly used as part of the telephone circuit, can be wired externally to do the job as long as the telephone line is extended to the place where the extra ringer is to be installed [193].

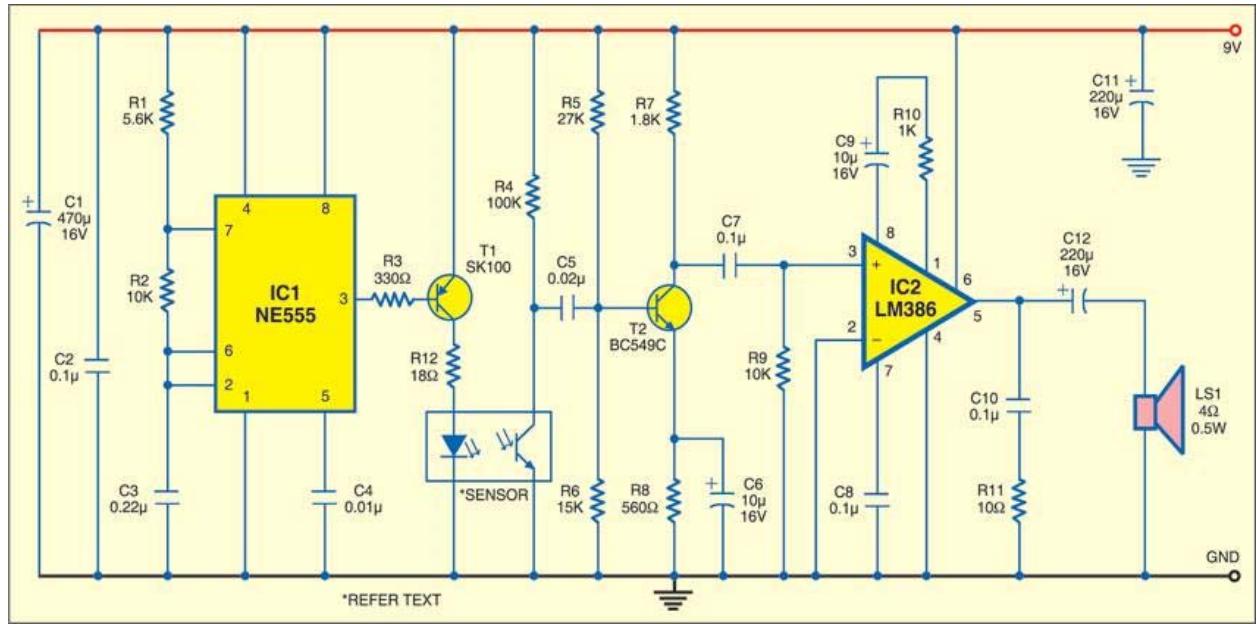


Another circuit [194].



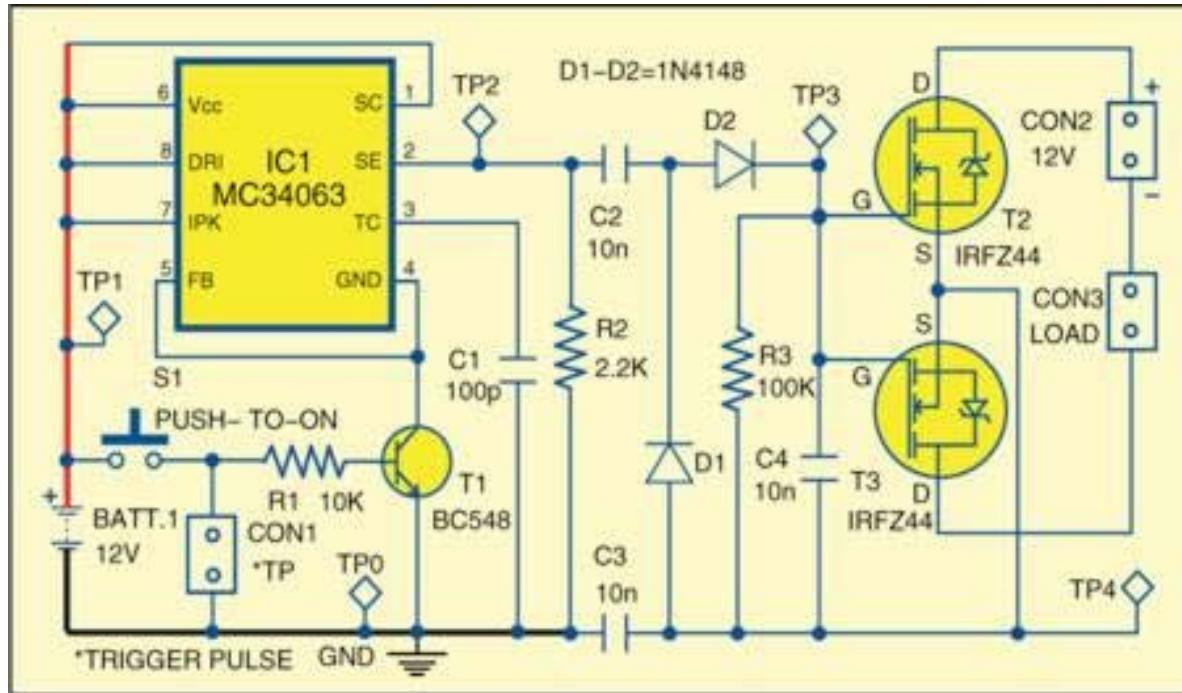
193. Audible IR Proximity Detector

This circuit gives an audible indication when any object comes in front of the infrared reflecting sensor (containing IR LED and phototransistor). The sound generated by the sensor will be louder if the object close to the reflecting sensor is opaque [195].



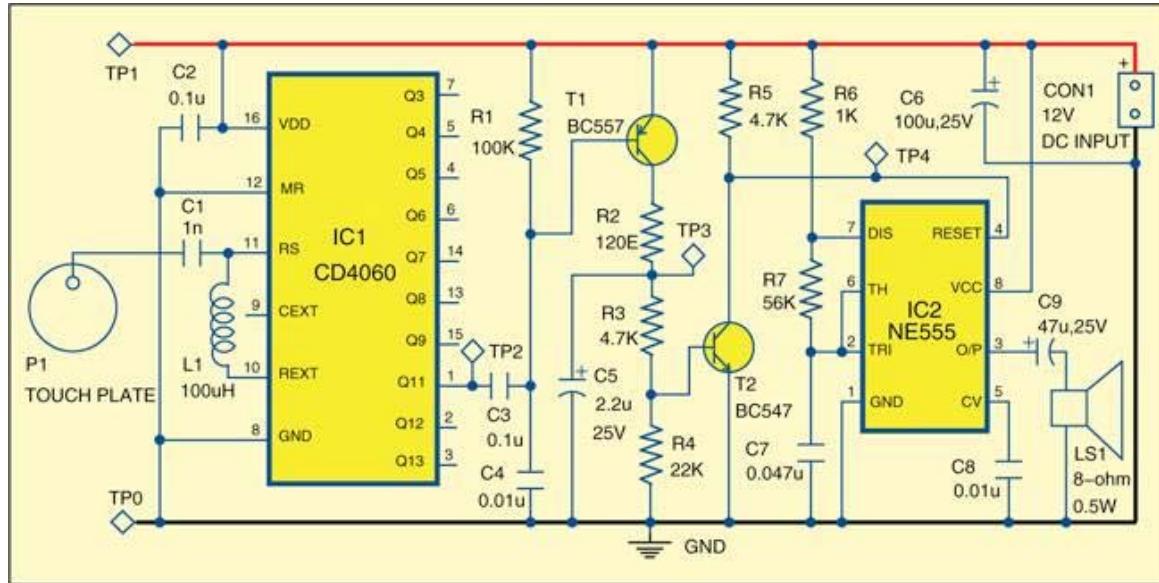
194. Semiconductor Relay for Automotive Applications

Semiconductor relays provide the same function as electromechanical relays but have no moving parts, which increases their long-term reliability. These relays provide an array of solutions, meeting the needs of today's high-performance applications [196].



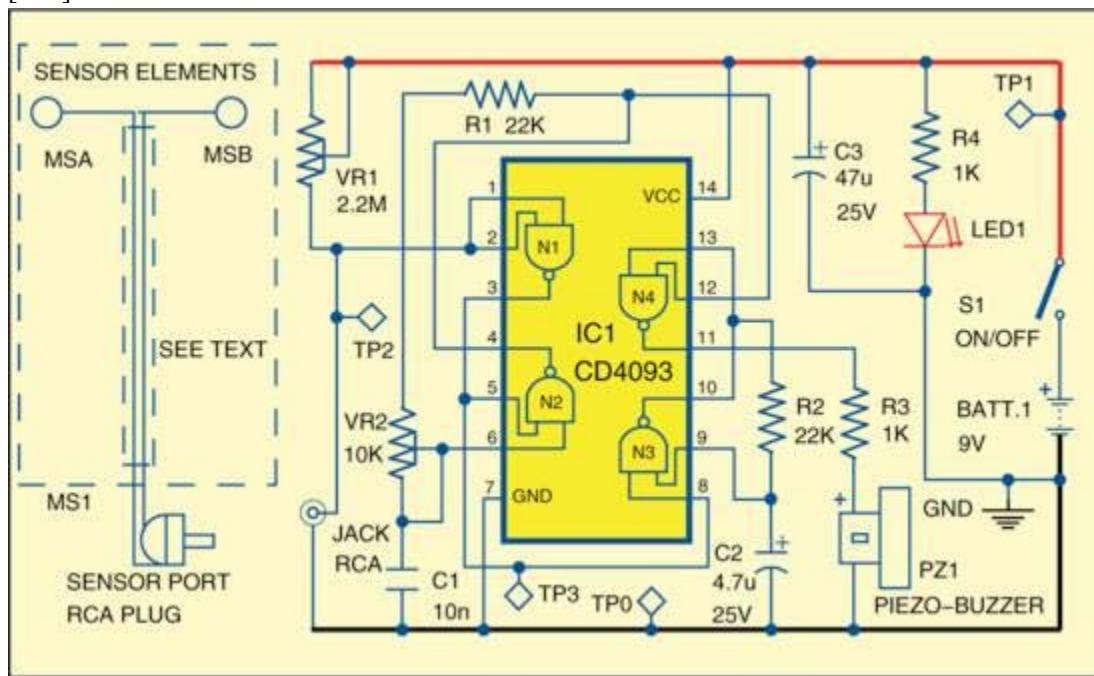
195. Touch Alarm

This is a new type of touch alarm that uses an RF oscillator at its input. One special feature of this touch alarm is that it can use a big-size touch plate. Also, no shielded wire is required between the touch plate and the circuit [197].



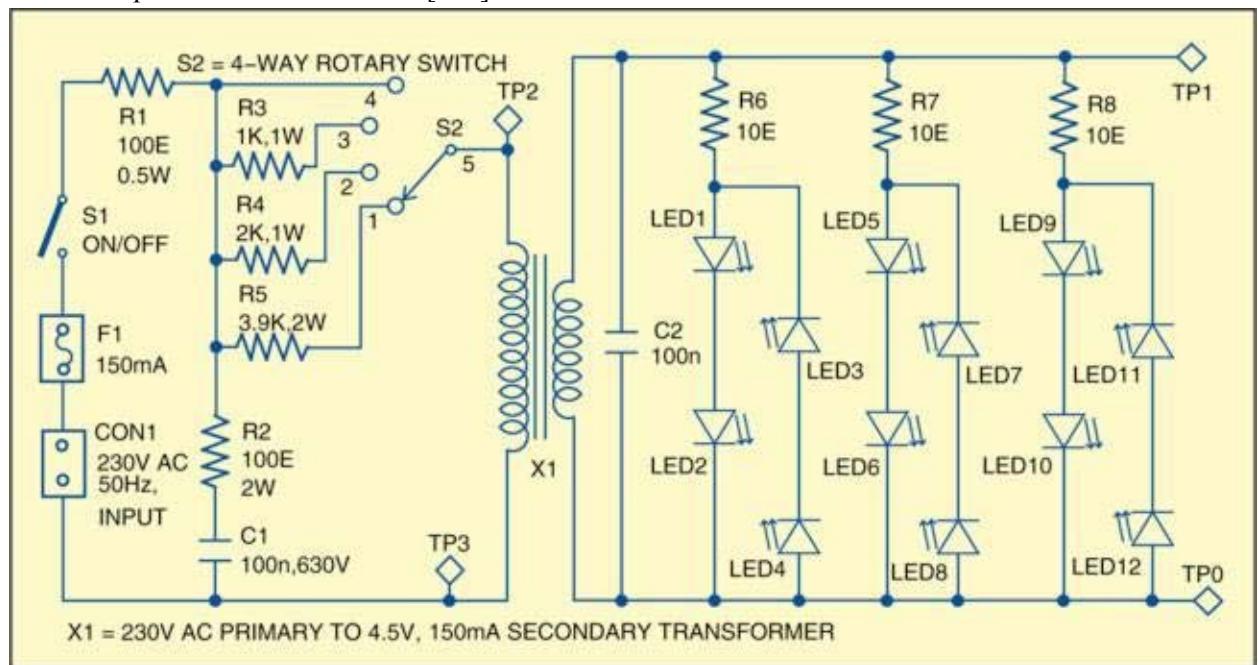
196. Bedwetting Alarm

Bedwetting is one of the most common childhood problems that can have a significant impact on a child's health if left unattended. During the night, the parents would not know if the child has urinated and the kid may sleep all night long on a wet bed. Bedwetting alarm provides a very effective solution to this problem. The alarm will sound as soon as the child begins to wet the bed [198].



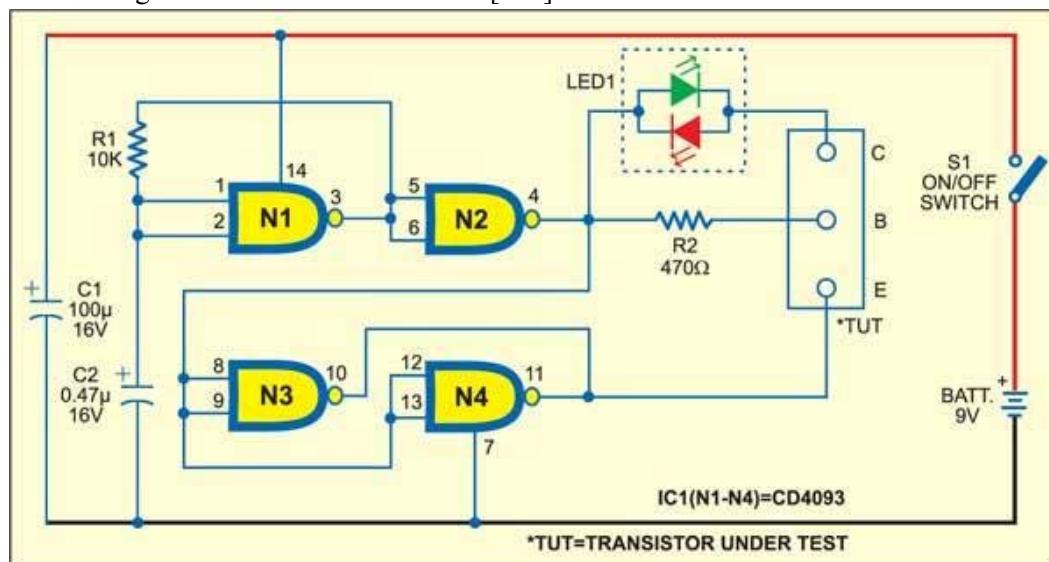
197. AC-Powered Led Lamps Without rectifiers

Usually, LED lamps require rectifier when connected to the AC mains power supply. Electrical isolation of the LED lamps from the mains is also required in most cases. But rectifiers create a switching noise and also add to their cost. Presented here is a simple circuit for LED lamps that doesn't require the use of rectifiers [199].



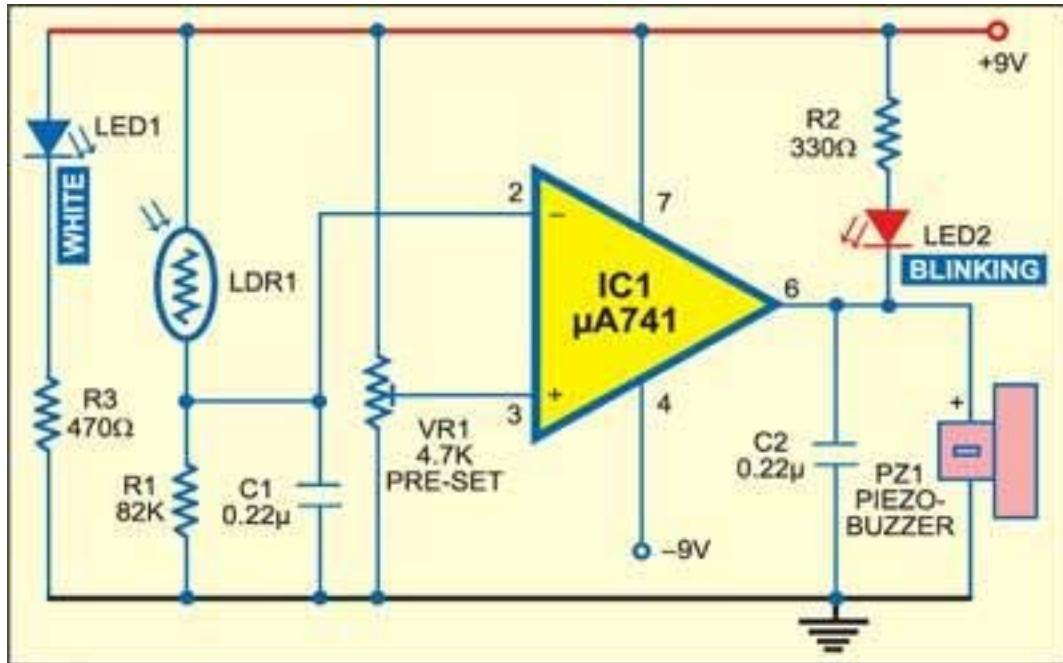
198. Easy Transistor Tester

Using this circuit, find out whether a given transistor is good or bad before soldering it. You can also identify npn and pnp types easily. The tester gives LED indication of the pin-outs as well as the working conditions of the transistors [200].



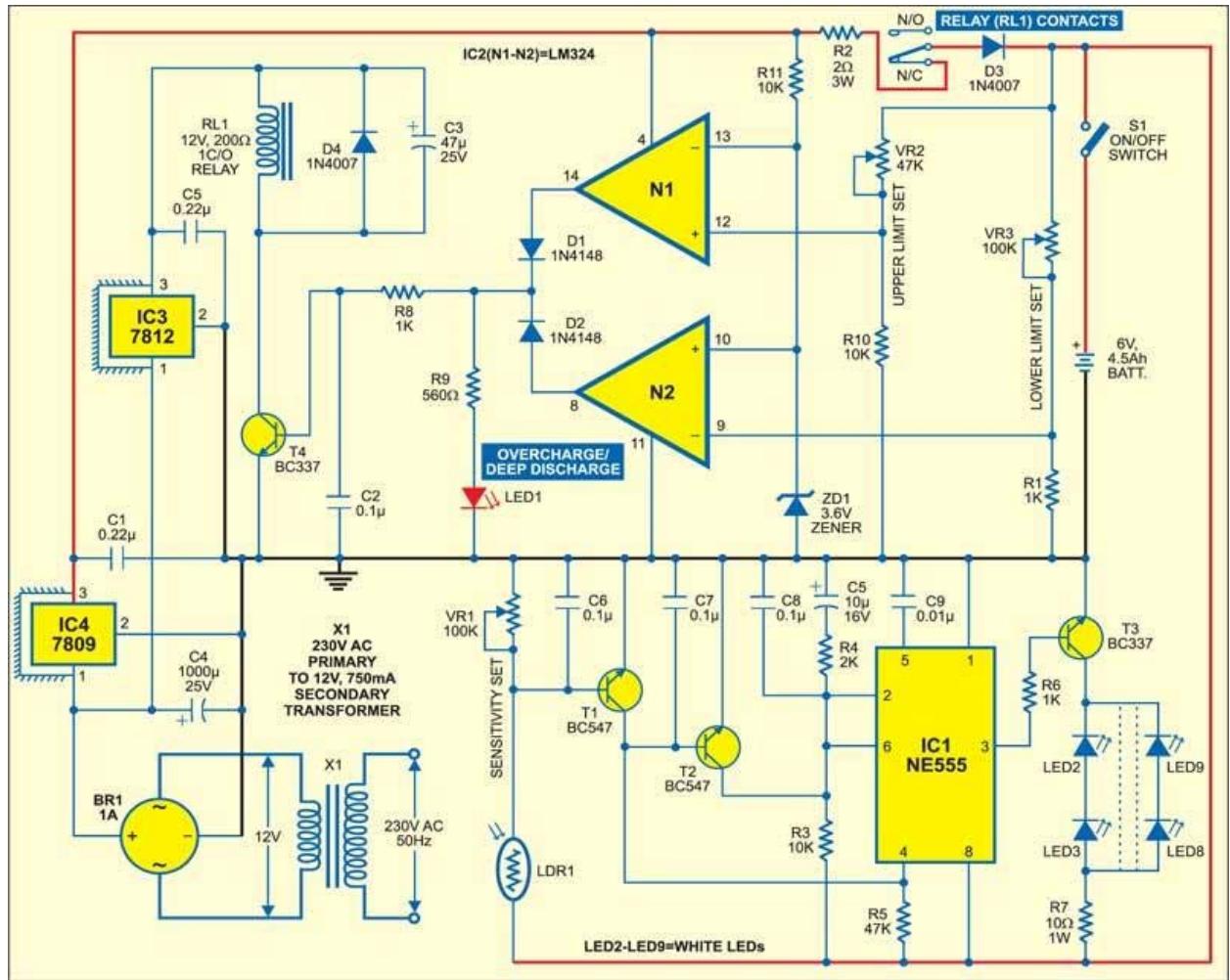
199. Door Guard

This door guard uses operational amplifier μ A741 and a light-dependent resistor (LDR). Operational amplifier μ A741 is used as a sensitive voltage comparator. Preset VR1 provides reference voltage to the non-inverting terminal (pin 3) of μ A741. LDR1 and resistor R1 are connected to inverting pin 2 of IC1. LED1 and LDR1 are installed at opposite sides of entry such that light from LED1 falls on LDR1 [201].



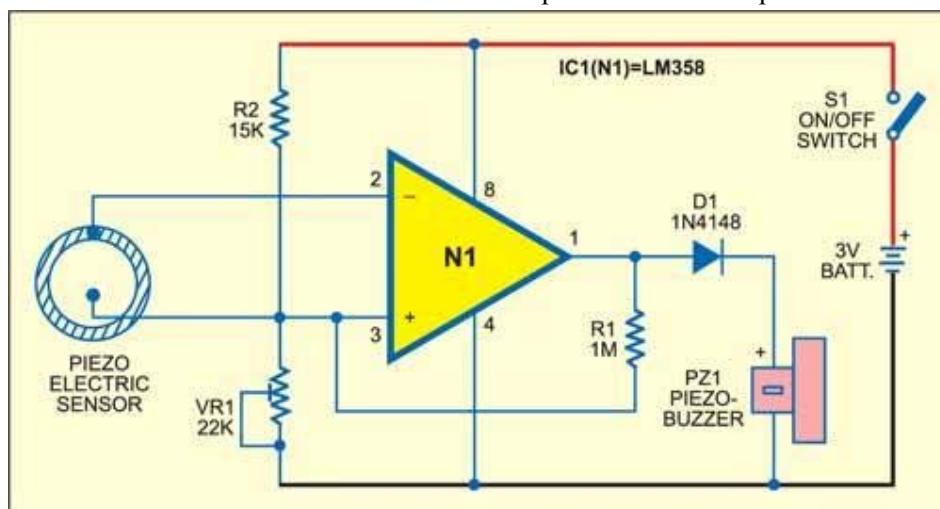
200. Low-cost Night Lamp

This simple, low-cost night lamp automatically activates at night and deactivates in the daytime. It incorporates battery charging circuit with protection against over-charging and deep-discharge [202].



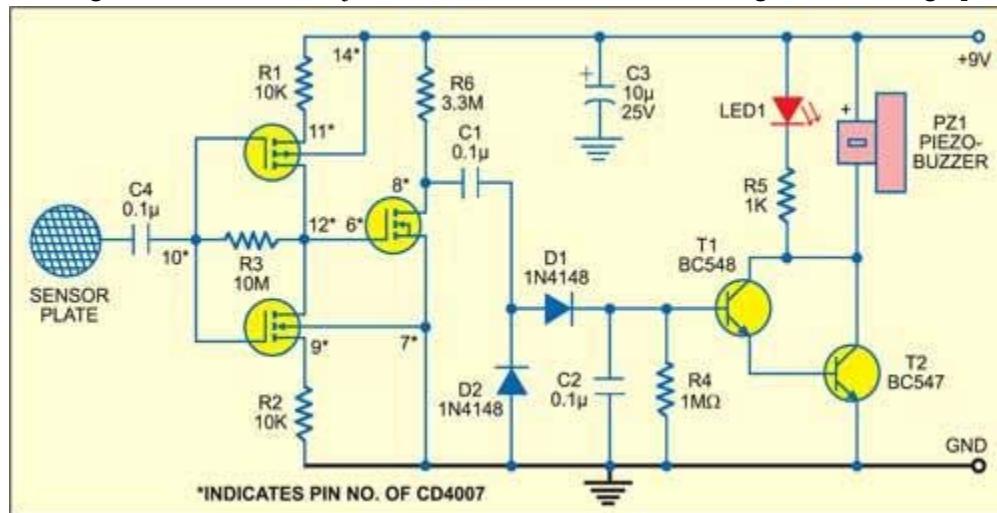
201. Briefcase Alarm

This miniature alarm unit protects your valuables from theft by sounding an alarm when somebody attempts to pick up your briefcase. It is a battery-operated gadget that can be hidden in a corner inside the briefcase. The circuit uses few components and is simple to fabricate [203].



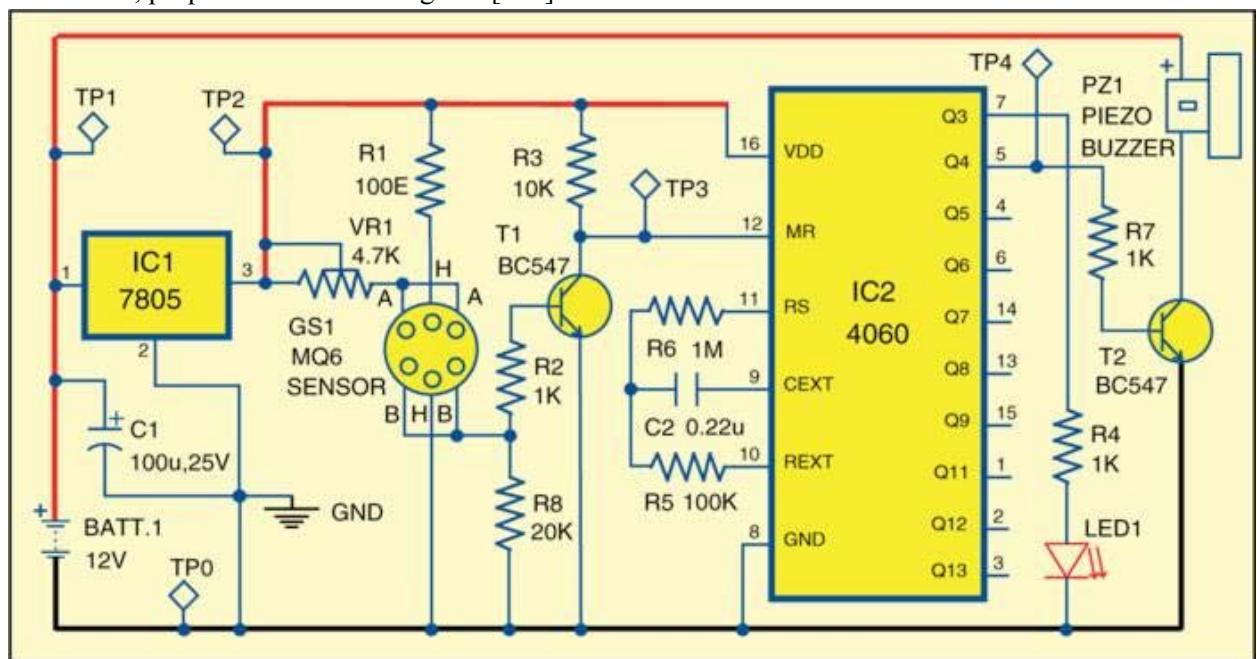
202. Touch-Plate Doorbell

This touch-plate doorbell makes use of enhancement-mode MOSFETs forming part of CMOS quad NAND gate CD4007B in conjunction with a detector and Darlington driver stage [204].



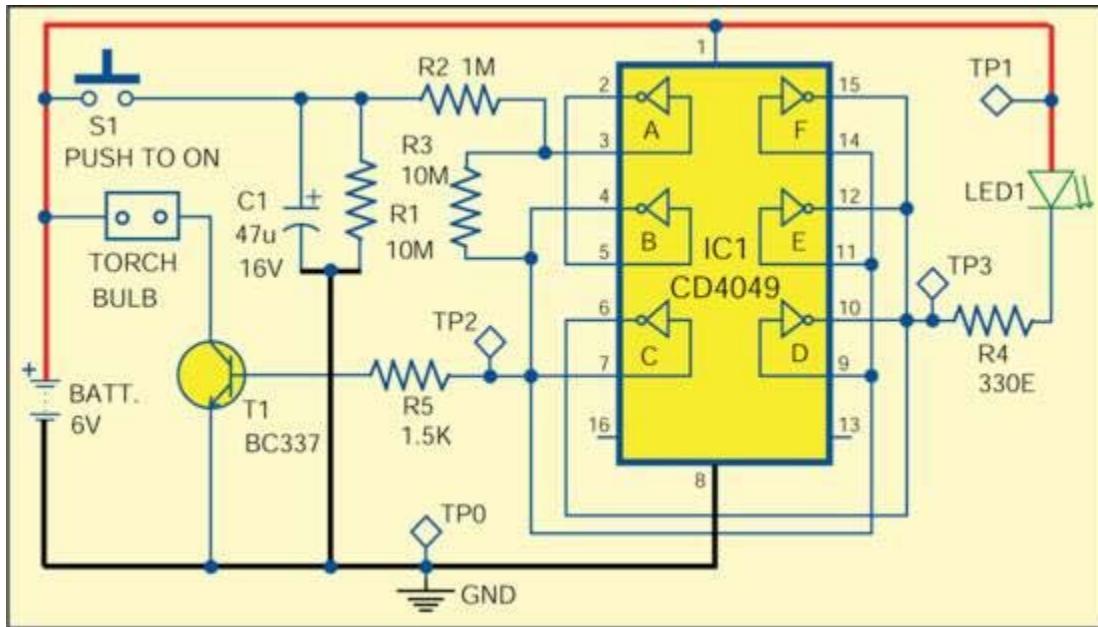
203. Sensitive LPG Leakage Alarm

Here is an ultra-sensitive LPG sensor that generates loud beeps when it senses any gas leakage. It detects vapours of liquefied petroleum gas anywhere between 200 and 10,000 ppm and drives a piezobuzzer to catch attention for immediate action. The buzzer beeps until the concentration of gas in the air decreases to a safe level. The circuit uses an MQ6 gas sensor, which is designed to sense LPG, propane and isobutane gases [205].



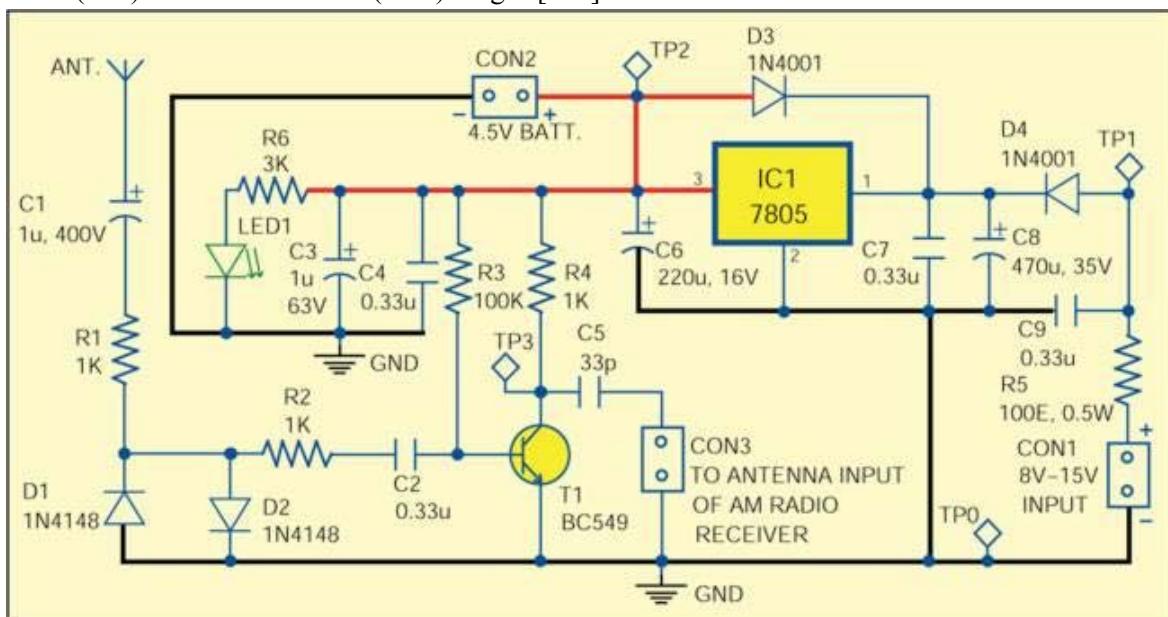
204. Cupboard light

Here is a simple circuit that can temporarily illuminate your cupboard or other such usually dark places where mains connection is either not possible or not worthwhile. The circuit is nothing but a battery-operated light with inbuilt auto shut-off [206].



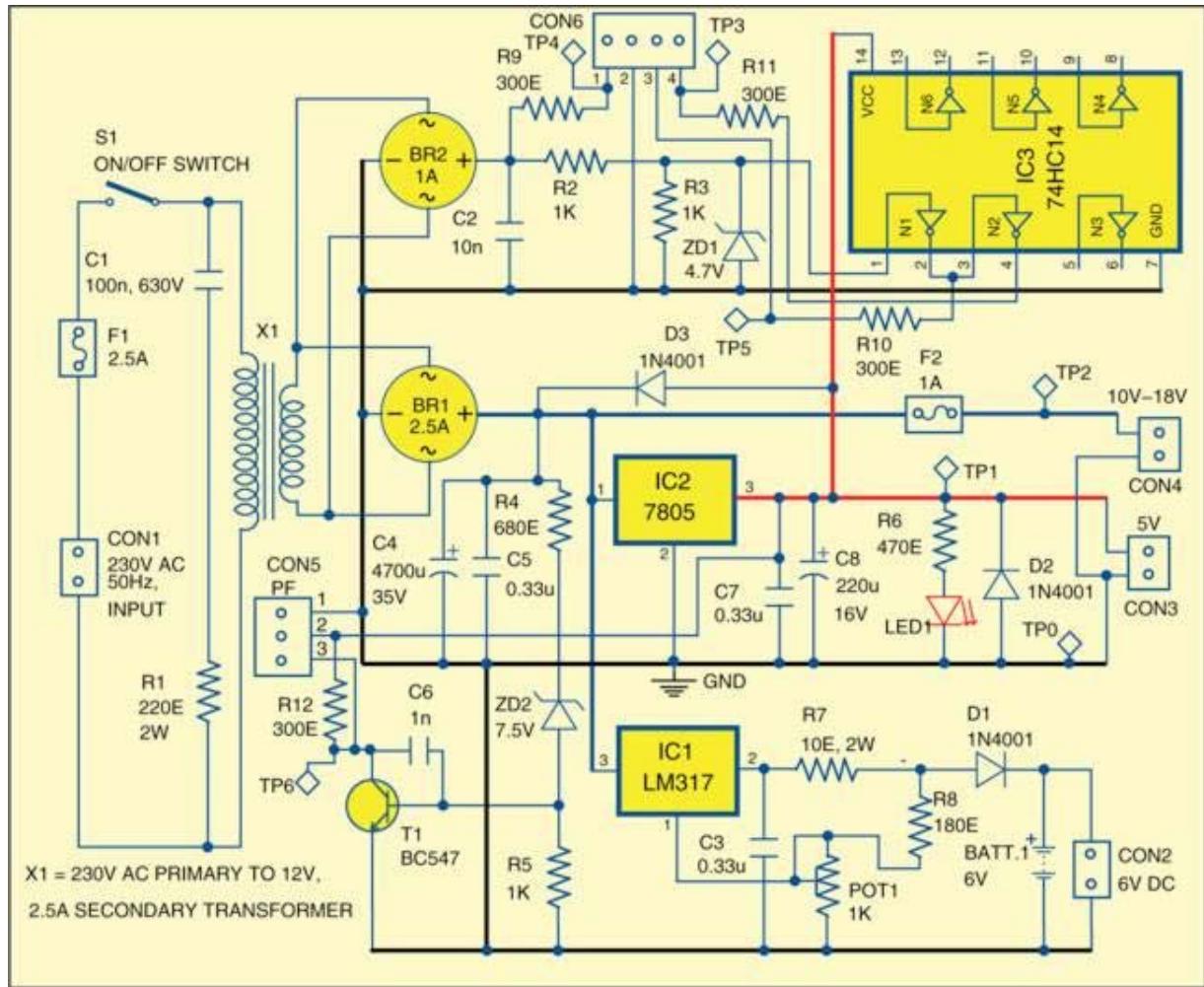
205. Simple Antenna Preamplifier for AM Radios

AM radios normally require long (10-30m) outdoor antennae. If you have no option but to use a relatively short antenna, you can improve the AM reception by adding the proposed low-noise antenna preamplifier for AM signals. Its operation range is 150-1700 kHz, covering the long-wave (LW) and medium-wave (MW) ranges [207].



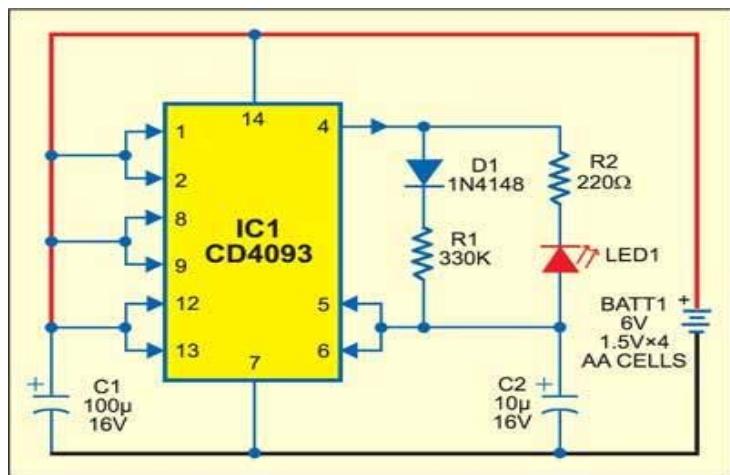
206. Multifunction Power Supply

Many embedded systems these days need +5V power supply with some special functions such as power-fail detection, zero-crossing signals for mains power supply and possibility to maintain the charging of built-in batteries [208].



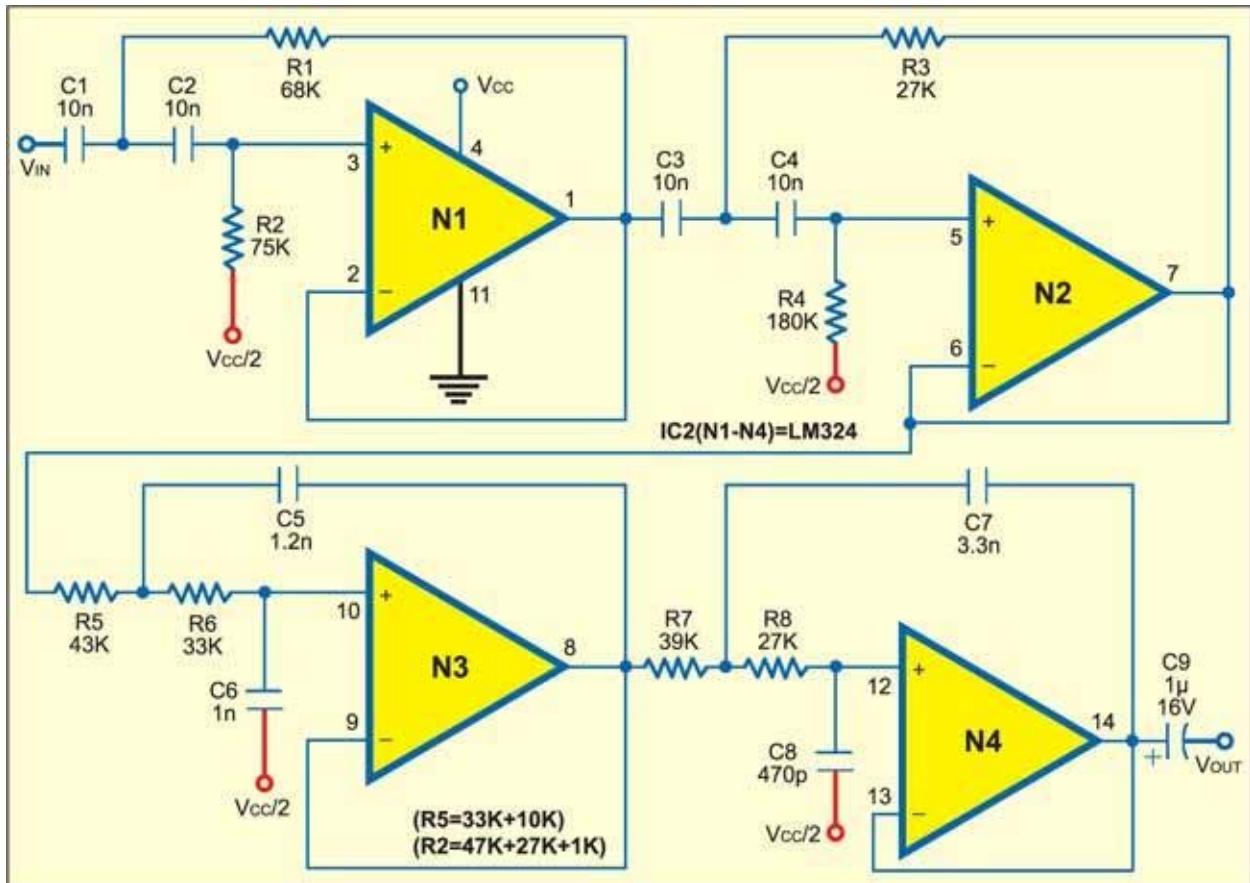
207. Micro-Power Flasher

With this micro-power flasher you can baffle the intruders trying to break into your home. The unit continuously emits flashing light both during day and night giving the impression that the occupants of the house are present inside. The circuit can run off four 1.5V AA-size cells continuously for a long period [209].



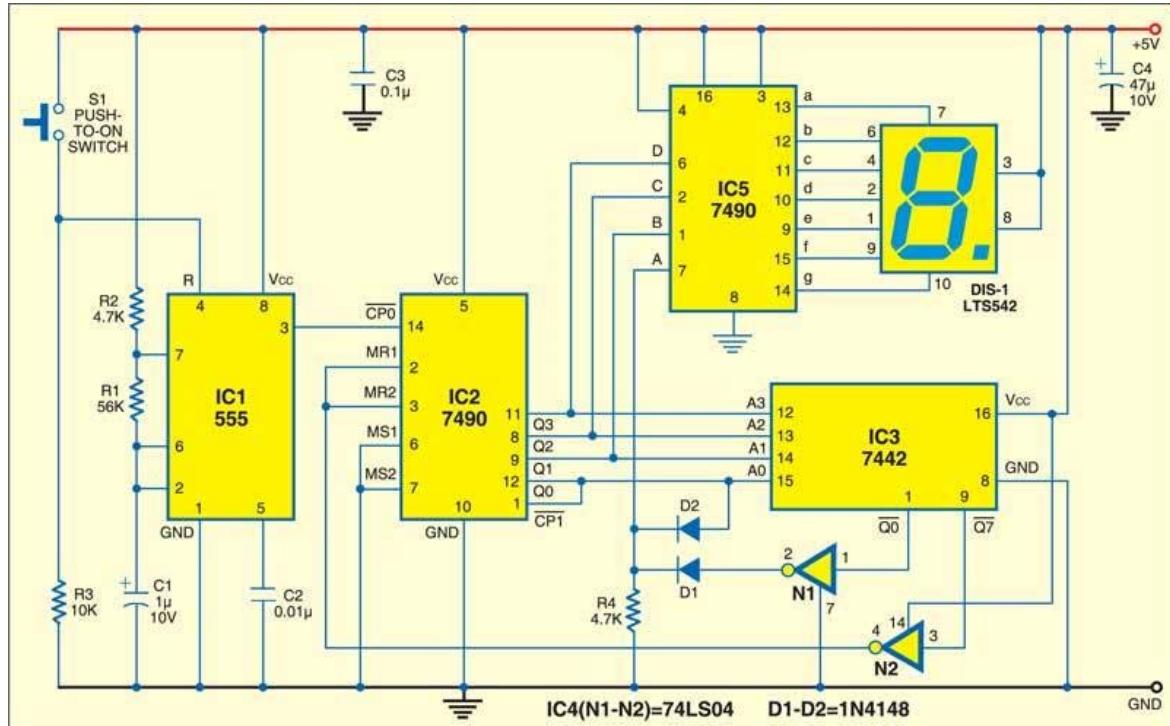
208. A Fourth-Order Speech Filter

Human speech generally occupies an audio spectrum of 300 to 3400 Hz. There is a requirement, especially in telephone circuits, to limit the frequency response to this range. The ‘Digital Speech Security System’ published in EFY Electronics Projects Vol. 19 also uses a similar filter. However, it uses dedicated filter ICs, which, besides being costly, are not easily available. This circuit will prove quite useful for not only the mentioned project but various other speech circuits [210].



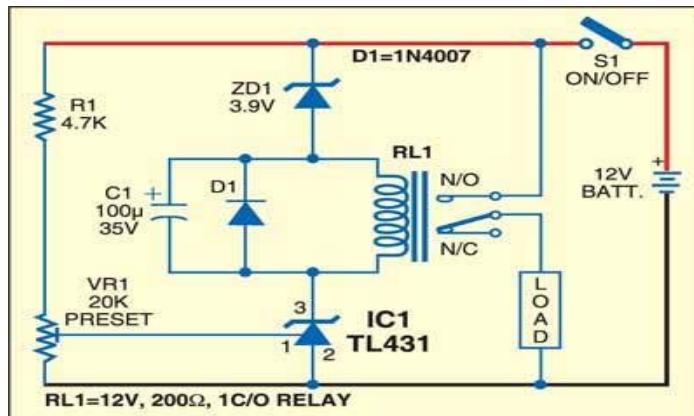
209. Electronic Ludo

Ludo, a traditional board game, requires the players to throw a dice by hand and move forward their tokens on the board by the number of squares indicated by the dice. In this electronic version, the players need to press a push-to-on switch instead of throwing the six-surface dice. When the switch is pressed momentarily, the 7-segment digital counter displays a number immediately. As in the manual dice, the numbers are displayed randomly between ‘1’ and ‘6’ depending on the time for which the player presses switch S1 [211].



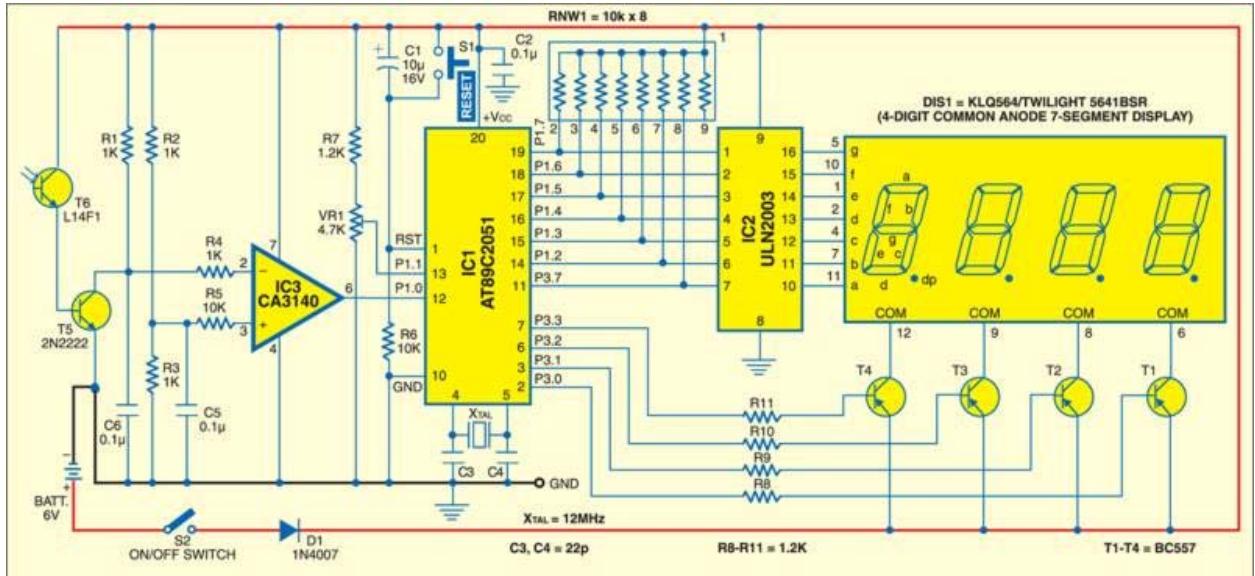
210. Smart Battery Protector Using a Shunt Regulator

The life expectancy of a battery dramatically reduces when it is discharged below the minimum recommended battery voltage. You must disconnect the load before discharging is complete. Otherwise, it can damage the battery or shorten its life. This simple circuit outperforms the usual battery protectors. It uses shunt regulator IC TL431 for its simplicity and marvellous functioning [212].



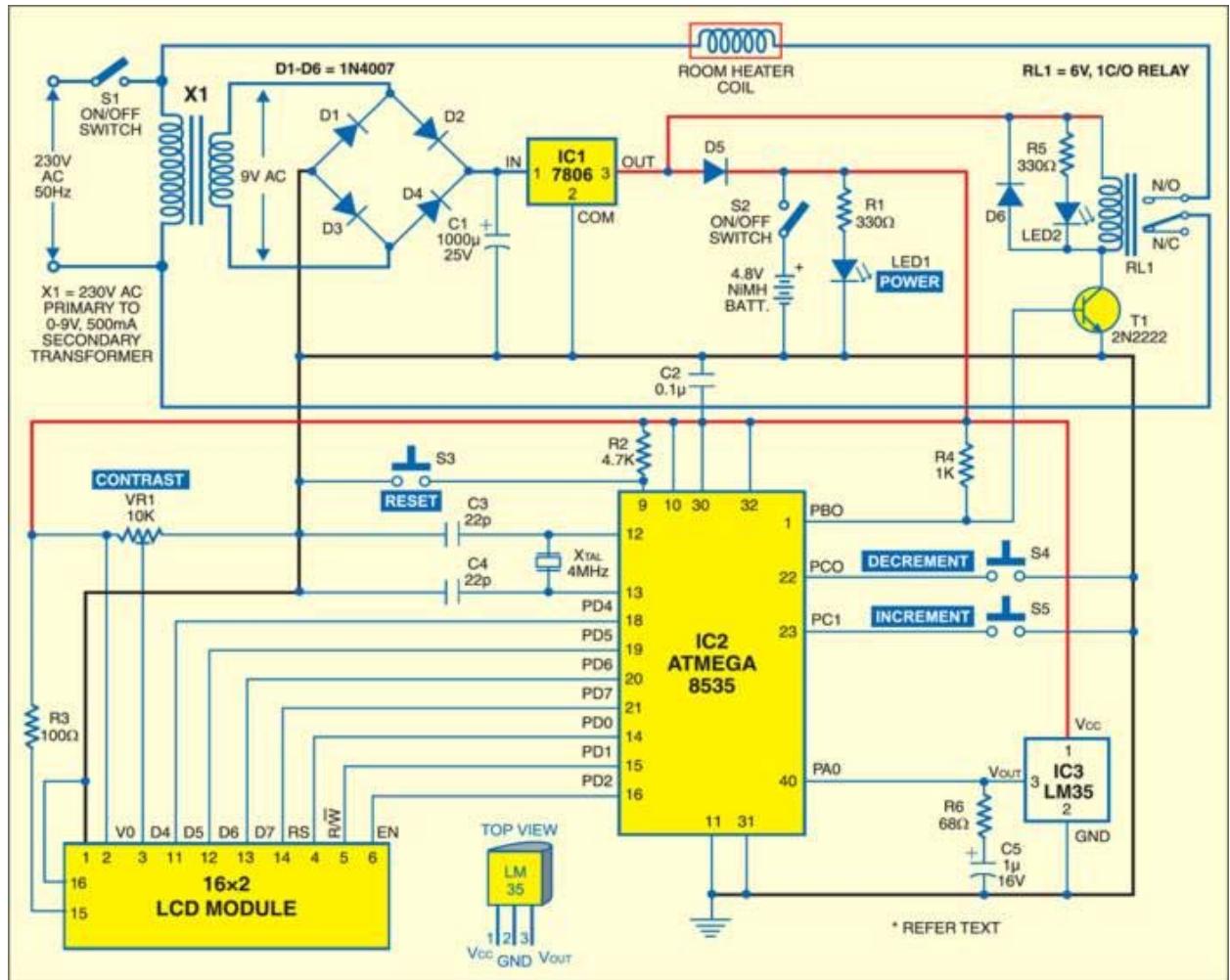
211. Microcontroller-Based Tachometer

A tachometer is nothing but a simple electronic digital transducer. Normally, it is used for measuring the speed of a rotating shaft. The number of revolutions per minute (rpm) is valuable information for understanding any rotational system. For example, there is an optimum speed for drilling a particular-size hole in a particular metal piece; there is an ideal sanding disk speed that depends on the material being finished. You may also want to measure the speed of fans you use [213].



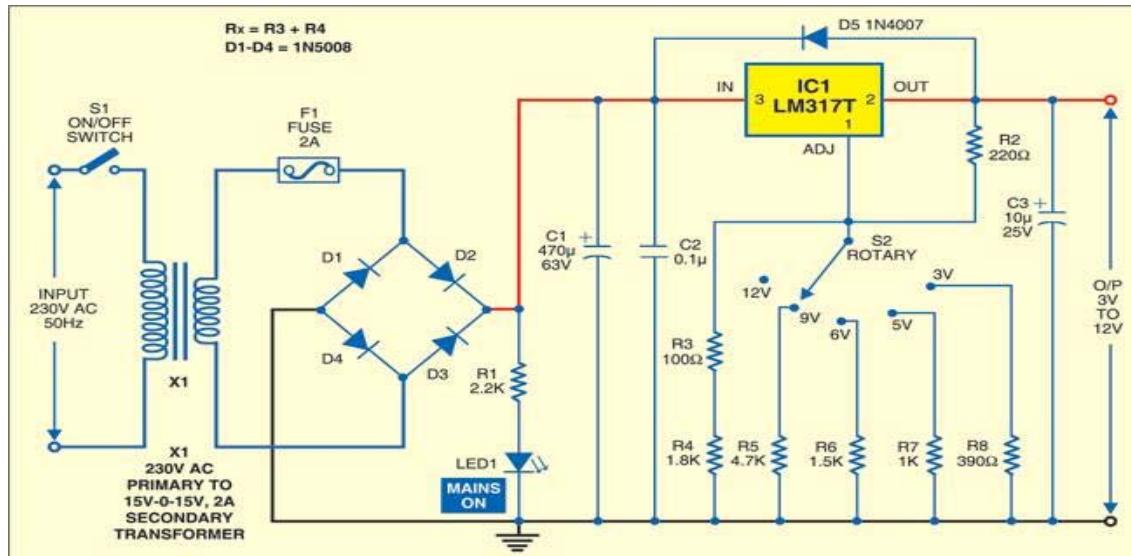
212. Temperature Indicator-CUM-Controller

Here is an easy-to-construct temperature indicator-cum-controller that can be interfaced with a heater's coil to maintain the ambient room temperature. The controller is based on Atmega8535 microcontroller, which makes it dynamic and faster, and uses an LCD module to display and two keys to increase or decrease the set values [214].



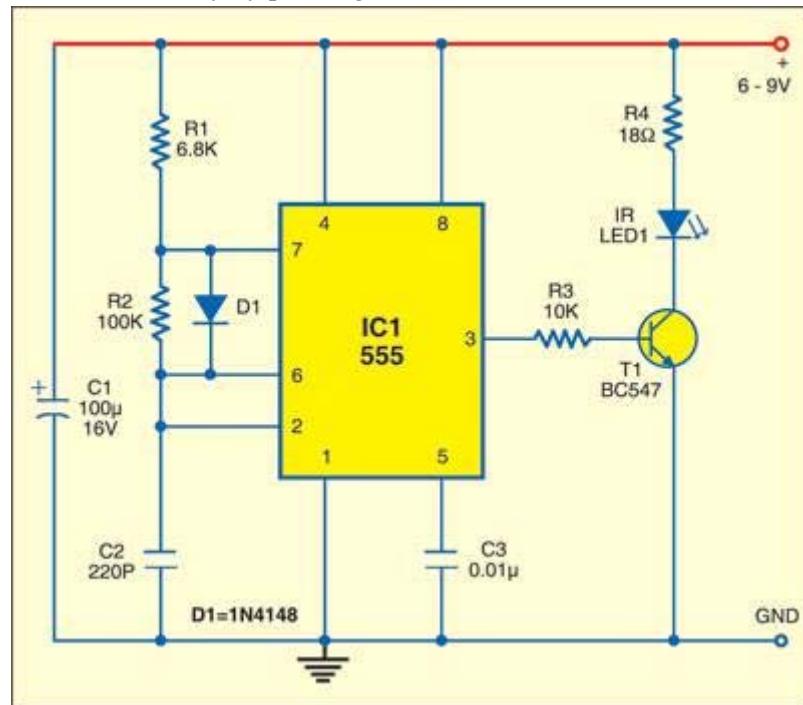
213. Stabilised Power Supply for Prototyping

This stabilised power supply circuit may be directly connected to 230V AC mains to derive output voltages of 3V to 12V DC for connection to the prototyping board [215].

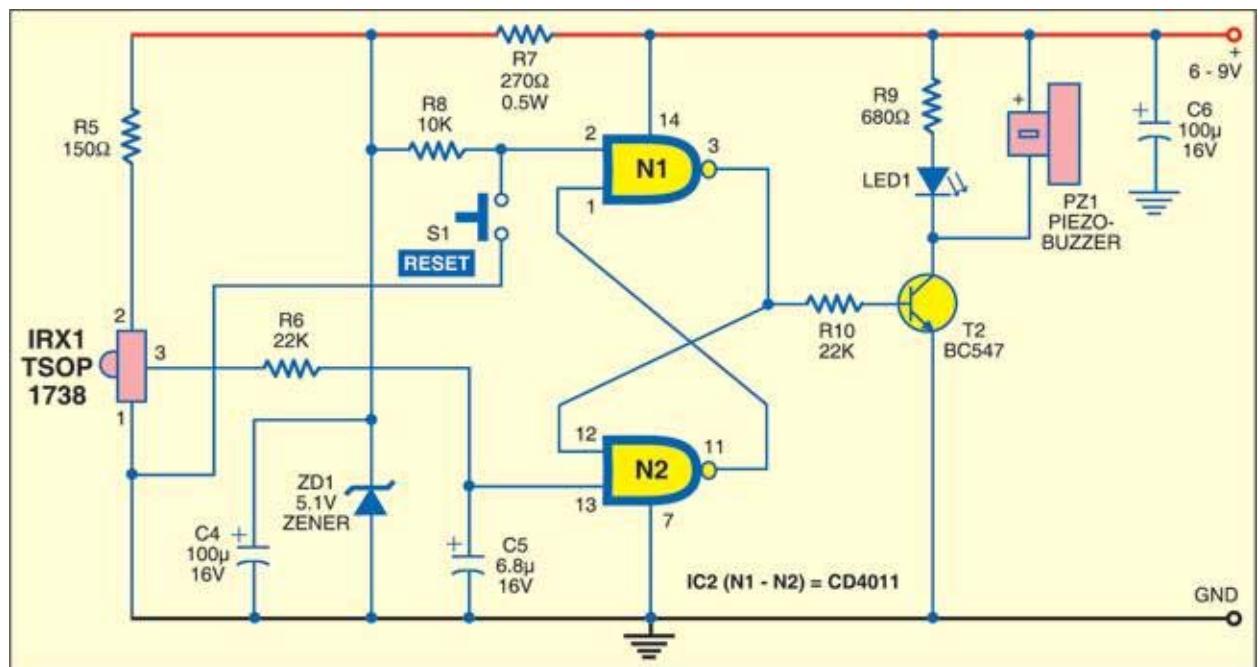


214. Infrared Burglar Alarm

A special feature of this infrared burglar alarm is latching operation. Also, the circuit is highly sensitive. The circuit comprises transmitter and receiver sections. Whenever IR beam between the transmitter and the receiver is interrupted, the alarm circuit is triggered and the buzzer sounds continuously. It can be reset only by pressing the reset button [216].

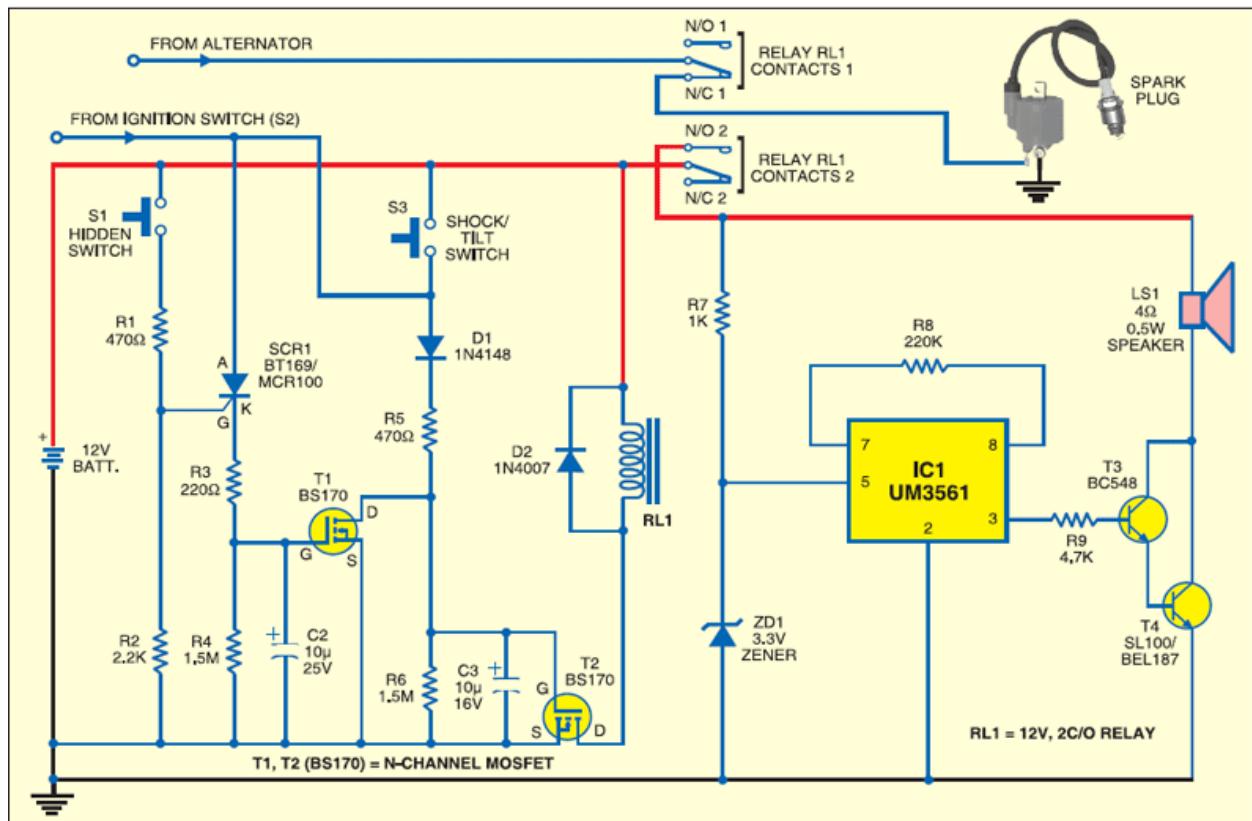


Another circuit



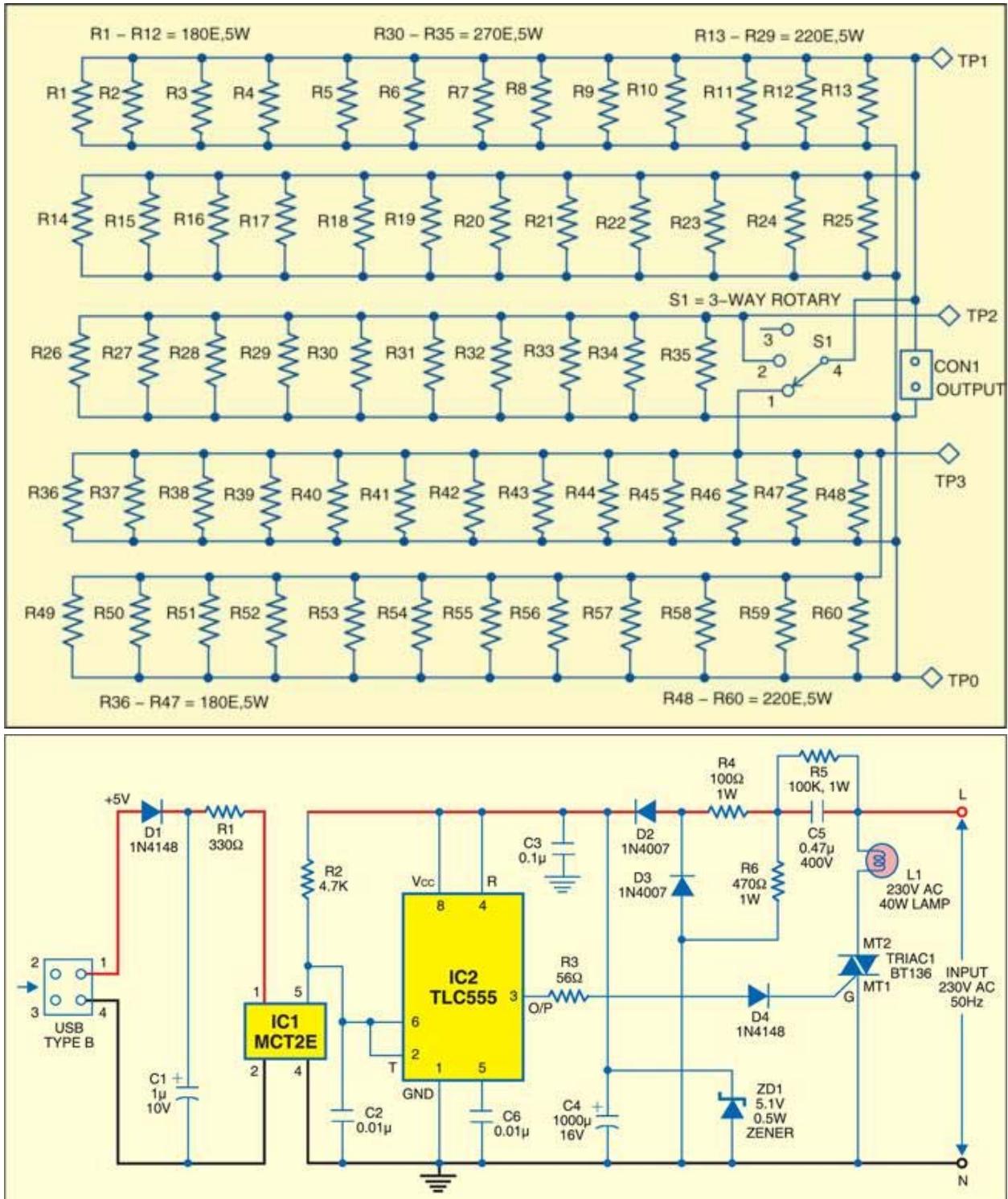
215. Motorbike Alarm

This simple-to-build alarm can be fitted in bikes to protect them from being stolen. The tiny circuit can be hidden anywhere, without any complicated wiring. Virtually, it suits all bikes as long as they have a battery. It doesn't drain out the battery though as the standby current is zero [217].



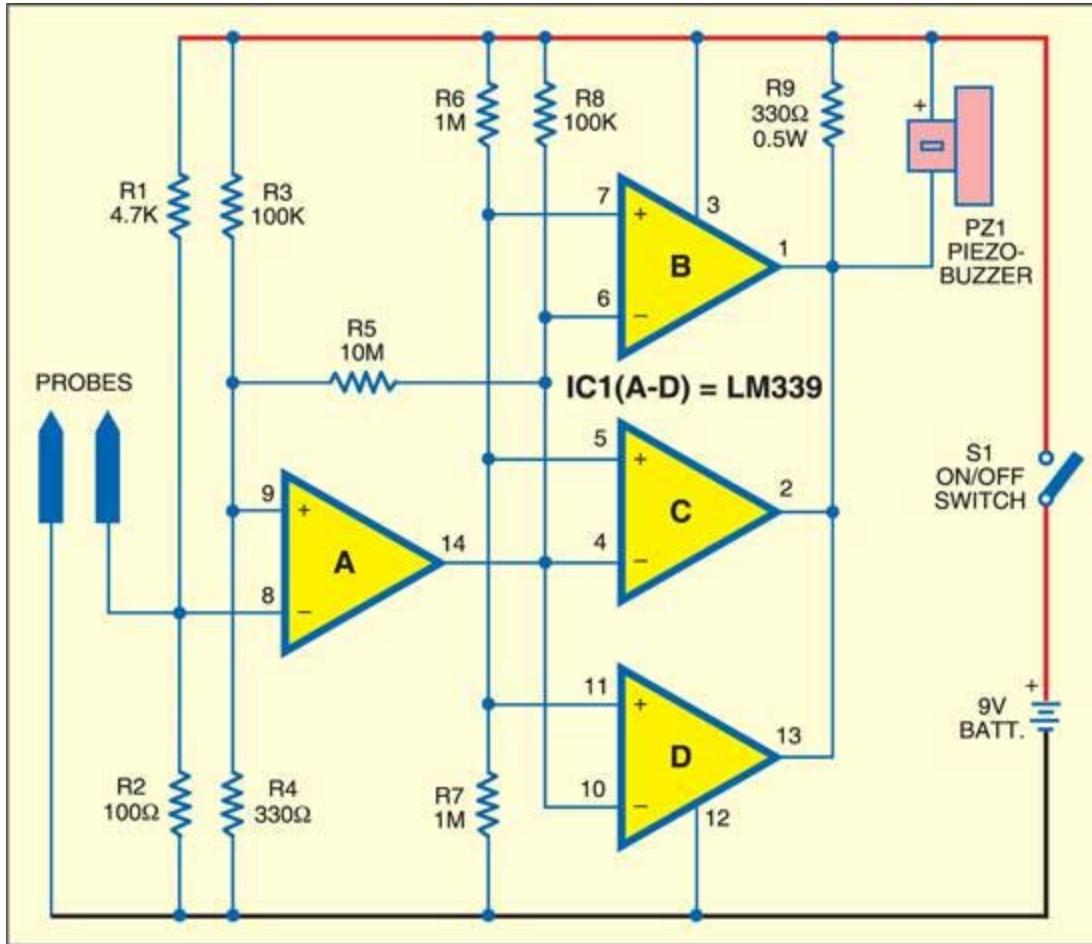
216. PC Table Lamp

This useful circuit is built around well-known timer IC TLC555. It activates an electric bulb when your PC is switched ‘on’. When you shut down the PC, the lamp also automatically turns ‘off.’ [219,220].



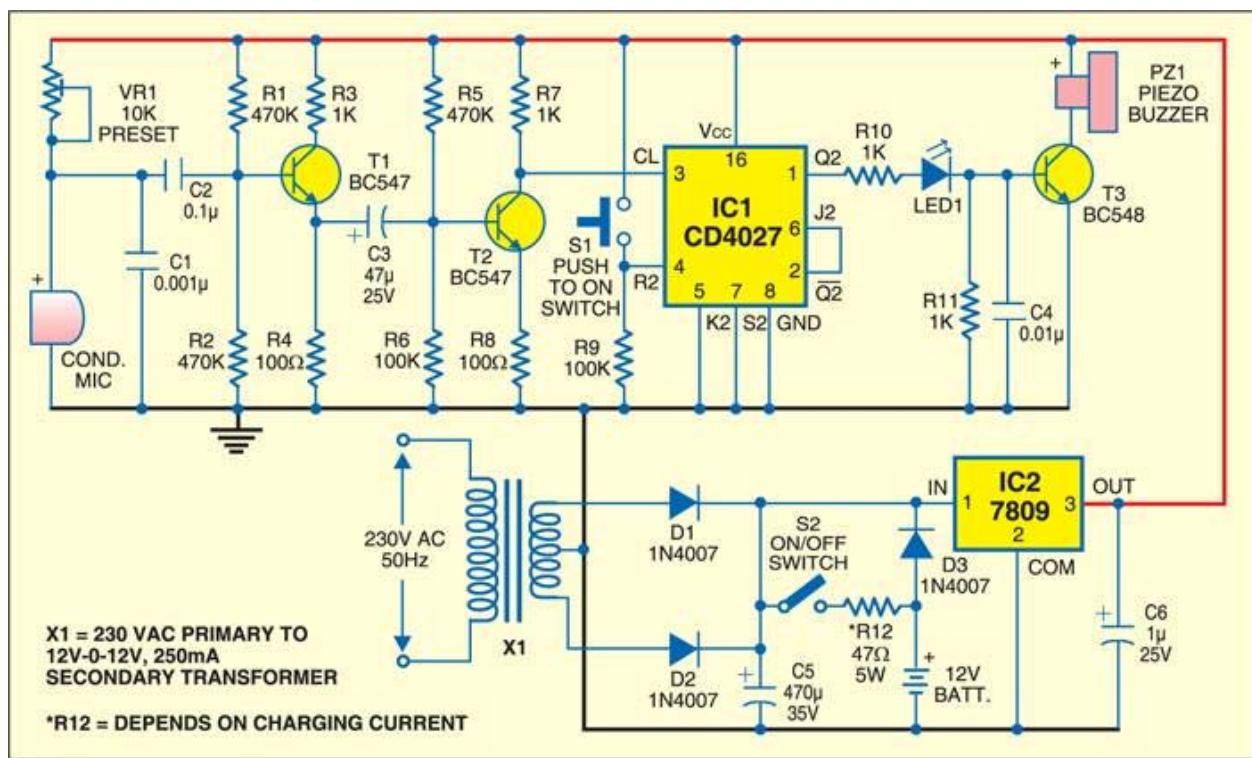
217. Audible Continuity Tester

Here is a pretty simple, low-cost audible continuity tester that makes use of just one quad comparator IC LM339, some resistors and a piezobuzzer. The circuit including the comparator works off a single 9V battery. Only one of the quad comparators is used in its real role, while the remaining three comparators, connected in parallel, are used for directly driving a medium-power piezobuzzer [221].



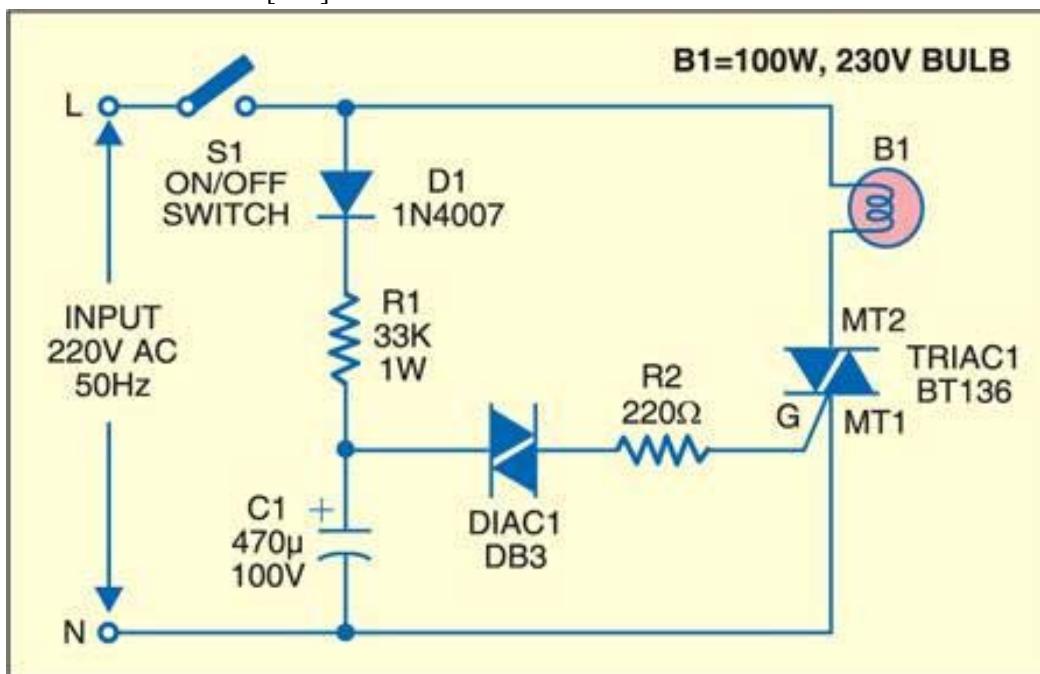
218. Anti-Theft Alarm

You can use this circuit to thwart burglary. It sounds an alarm when someone tries to intrude into your home or office by hitting, pushing or knocking the door. The sensor element is a condenser mic, which is fitted inside the house on the entrance door, preferably on the door frame. Hitting, pushing or knocking the door will generate some noise. This is detected by the mic and fed to the preamplifier section of the circuit, which is connected to the buzzer through Flip-Flop. Thus the buzzer sounds when someone hits/knocks at the entrance door [222].



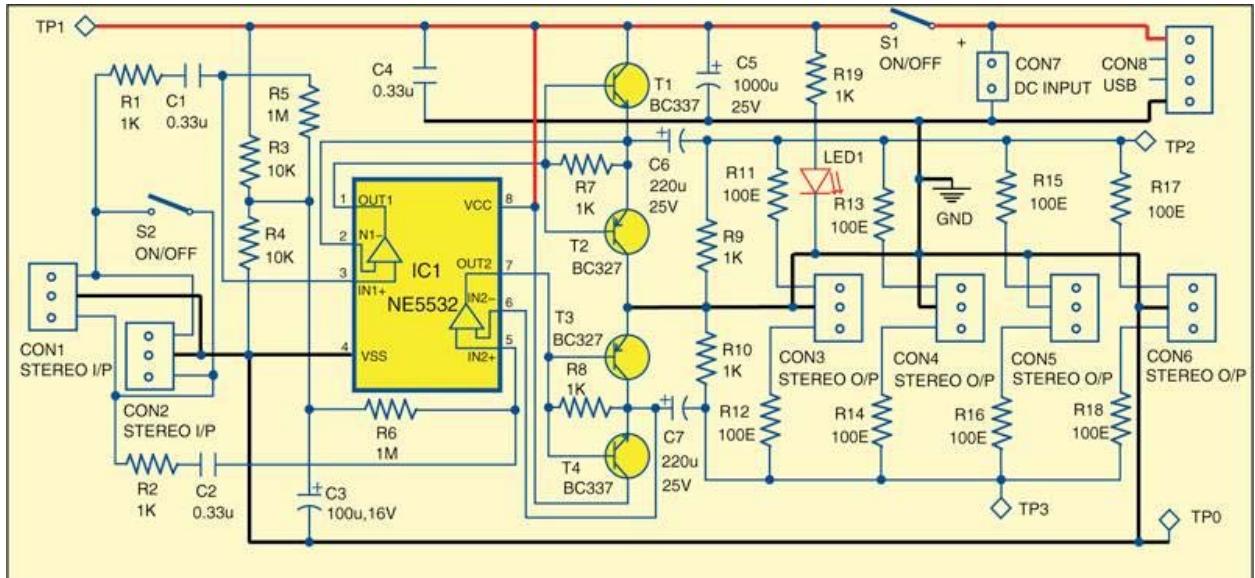
219. Diac-Controlled Flasher

This simple flasher finds various industrial applications as a high-voltage indicator or machine-'on' indicator. It flashes once every second to give a warning indication. It is simple to design and can be wired lead-to-lead without using PCB. It is directly powered from 220V AC and can be enclosed in the mains box [223].



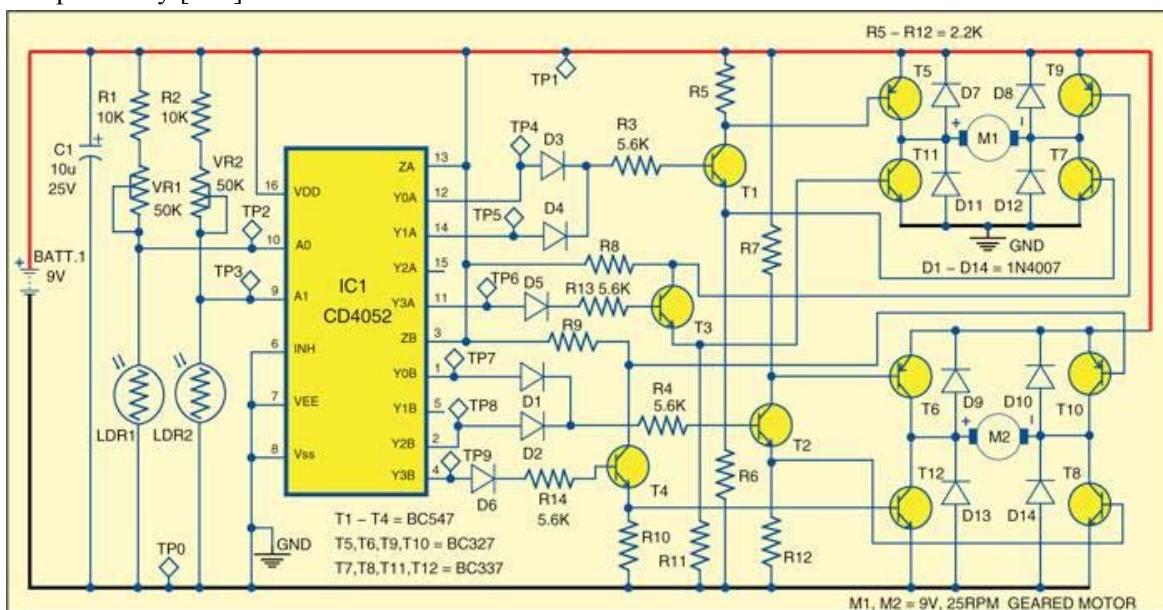
220. Stereo audio Distribution Buffer for headphones

Most audio signal sources have only one stereo output, which means they can drive only a single pair of headphones with a resistance of around 32 ohms or a single line of 600 ohms. But sometimes several people are required to connect their headphones to a single audio signal source—such as for entertainment, e-learning and training, or at home. In these situations, use of powerful loudspeakers is not desirable because other people in the room will get disturbed [224].



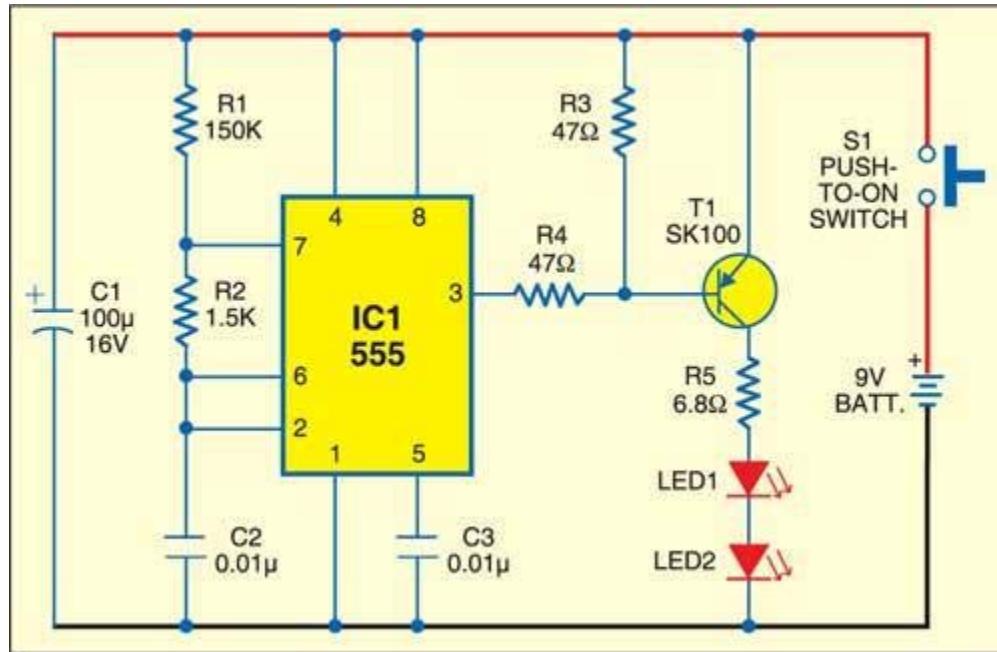
221. Dual Motor Control for Robots

Presented here is a simple circuit that can drive two motors for a small robot, allowing the robot to negotiate an obstacle course. Two light-dependent resistors (LDRs) are used to detect the obstacle and the motors are driven correspondingly to avoid the obstacles automatically. Two H-bridge motor circuits are used that can drive each motor forward or backward, or stop it, independently [225].



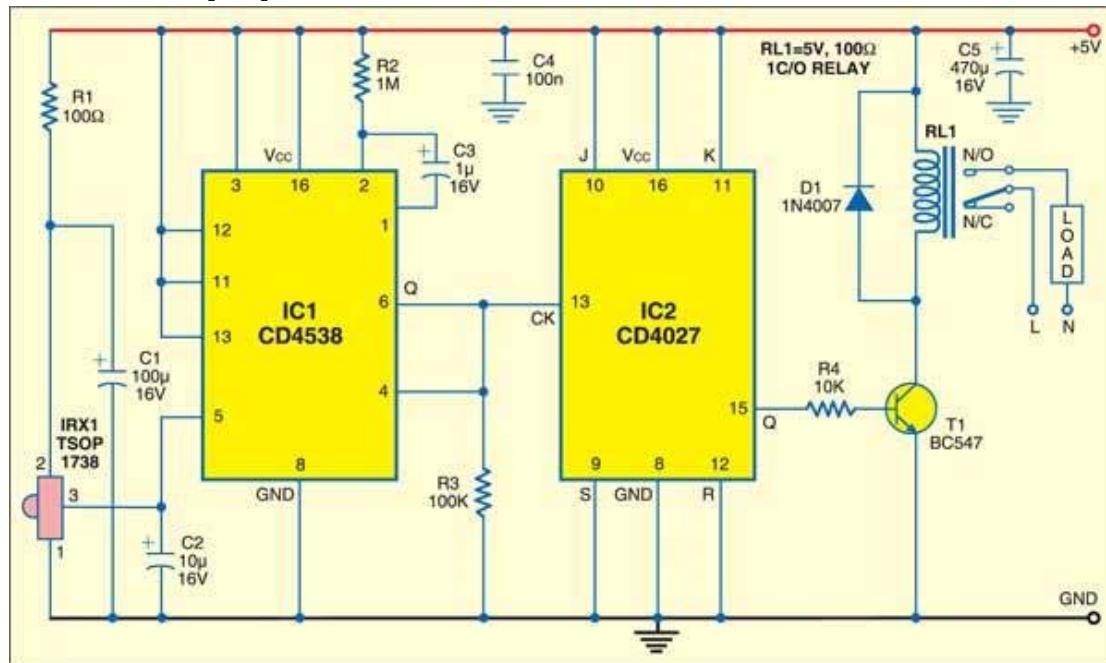
222. Optical Remote on/off Switch

Using this optical remote control, you can switch on/off any electrical or electronic load. Like any remote control system, it has a mini transmitter unit and a receiver unit to activate the relay [226].



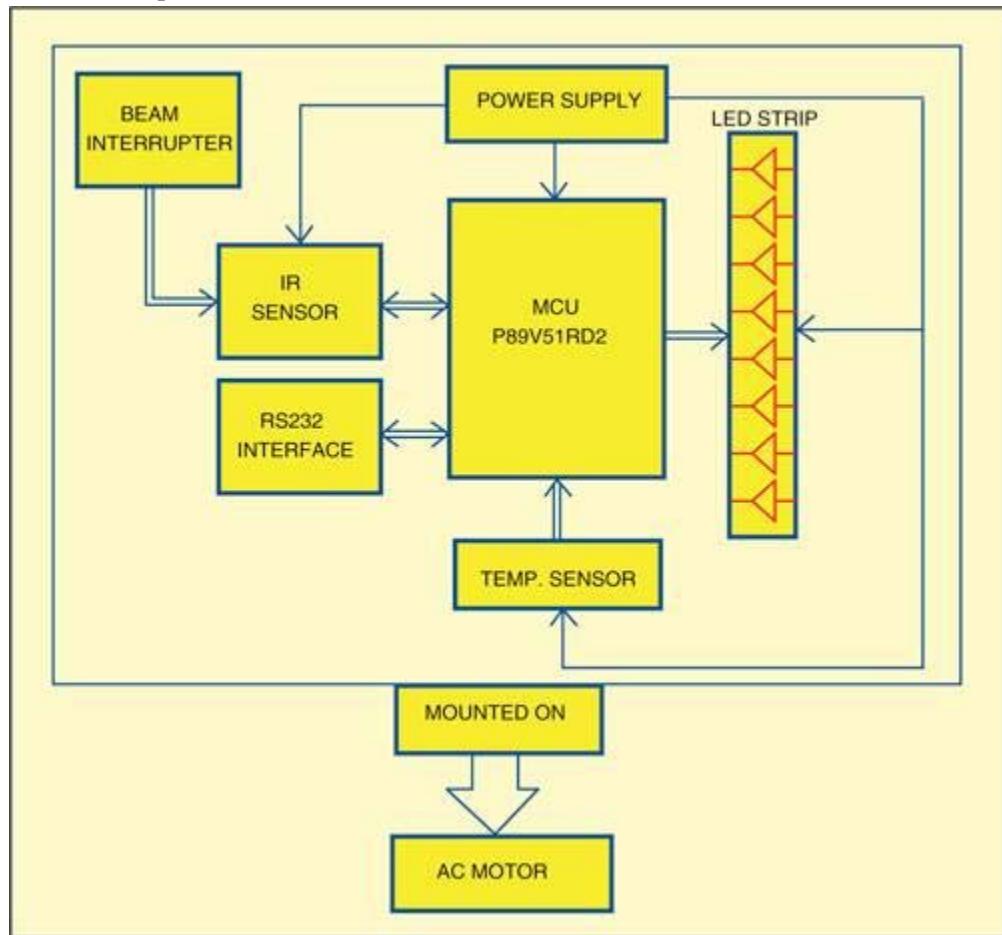
223. Infrared Toggle Switch

This infrared toggle switch can be controlled by any TV/VCR remote operating at 38kHz frequency. The circuit uses readily available, low-cost components and can be assembled on a small veroboard [227].



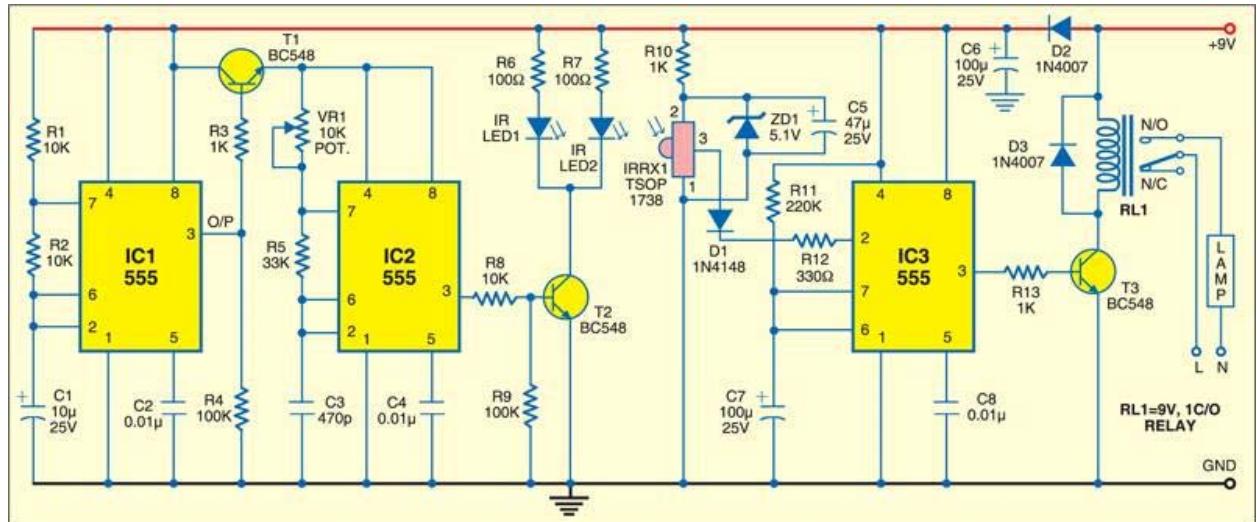
224. Contactless Telephone Ringer

This fully transistorised, simple circuit designed as a contactless telephone ringer provides an indication of incoming telephone call at a remote site like kitchen or bedroom in the building. It is implemented by winding five or more turns of a short hookup insulated wire around one of the wires of a twin telephone cable [228].



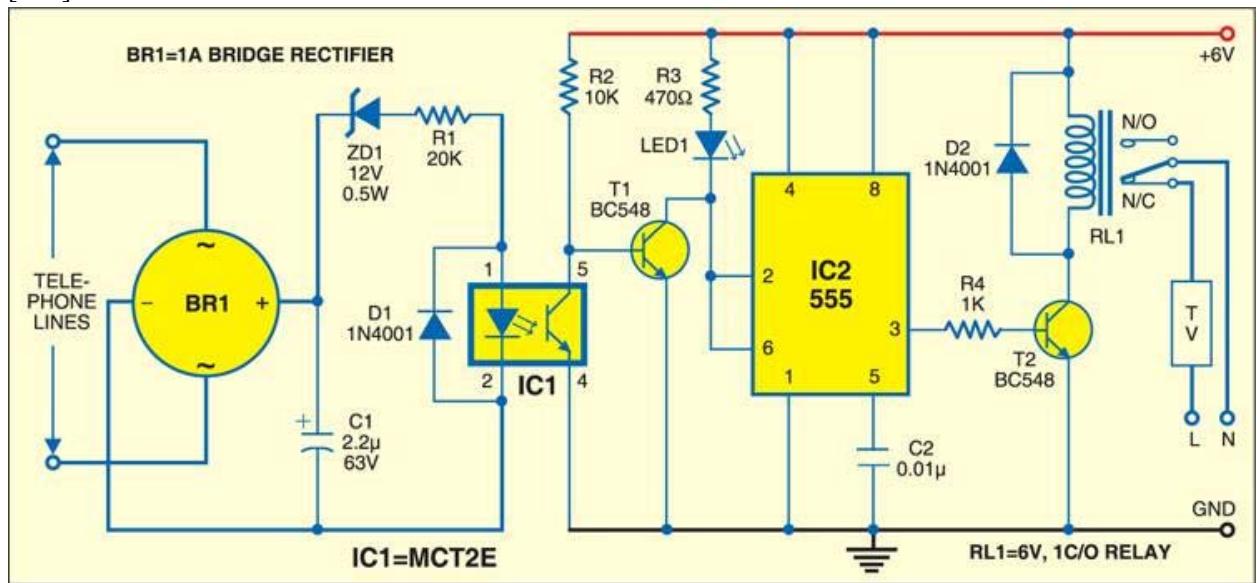
225. Automatic Wash Basin Mirror Lamp Controller

In restaurants, auditoria and even homes, many a times we forget to switch off the wash basin mirror lamp after use. The circuit given here automatically switches on the wash basin mirror lamp whenever you stand in front of it and switch off the same after you move out, thereby saving energy [229].



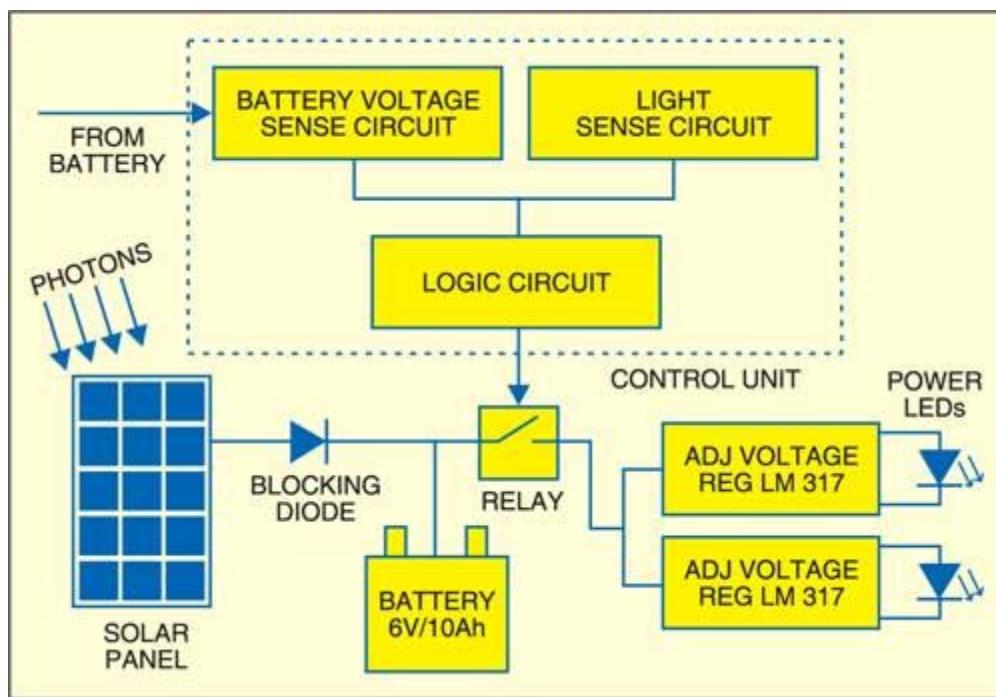
226. Auto Muting During Telephonic Conversation

Telephone conversation can be made disturbance-free using this simple circuit. As soon as you lift the telephone handset to converse, the TV, music system or any other appliance that may be causing disturbance gets switched off. It turns on when you place the handset back on the cradle [230].



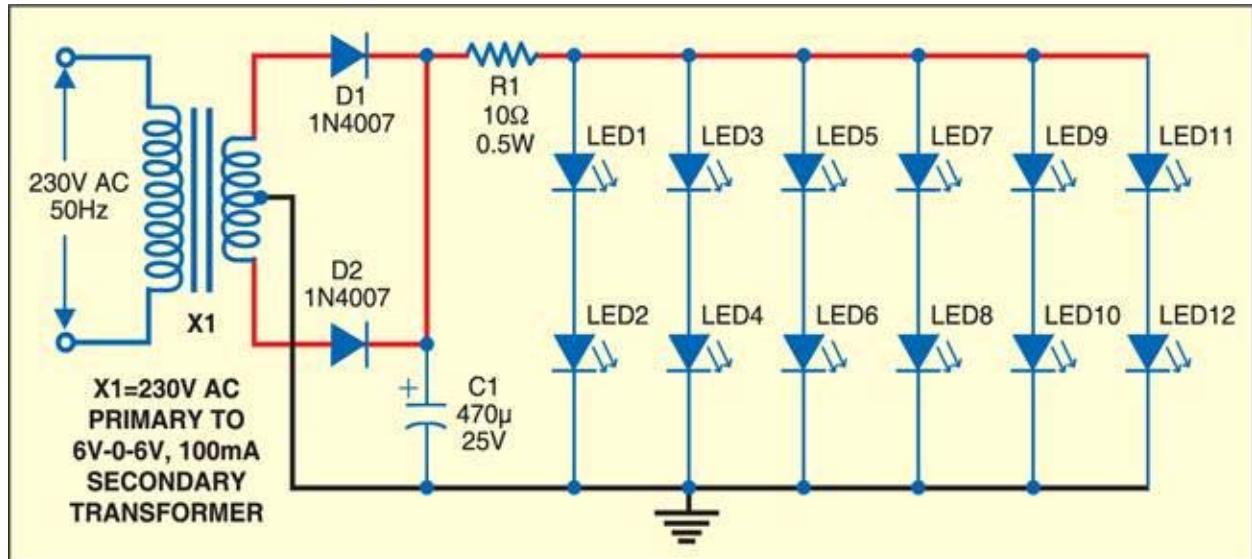
227. Solar-Powered Pedestal Lighting System

This solar-powered pedestal lighting system uses power LEDs for lighting. Solar energy is first converted into DC electricity by a solar photovoltaic cell and used to charge a storage battery. The solar energy stored in the battery is utilised at night for pedestal lighting using power LEDs [231].



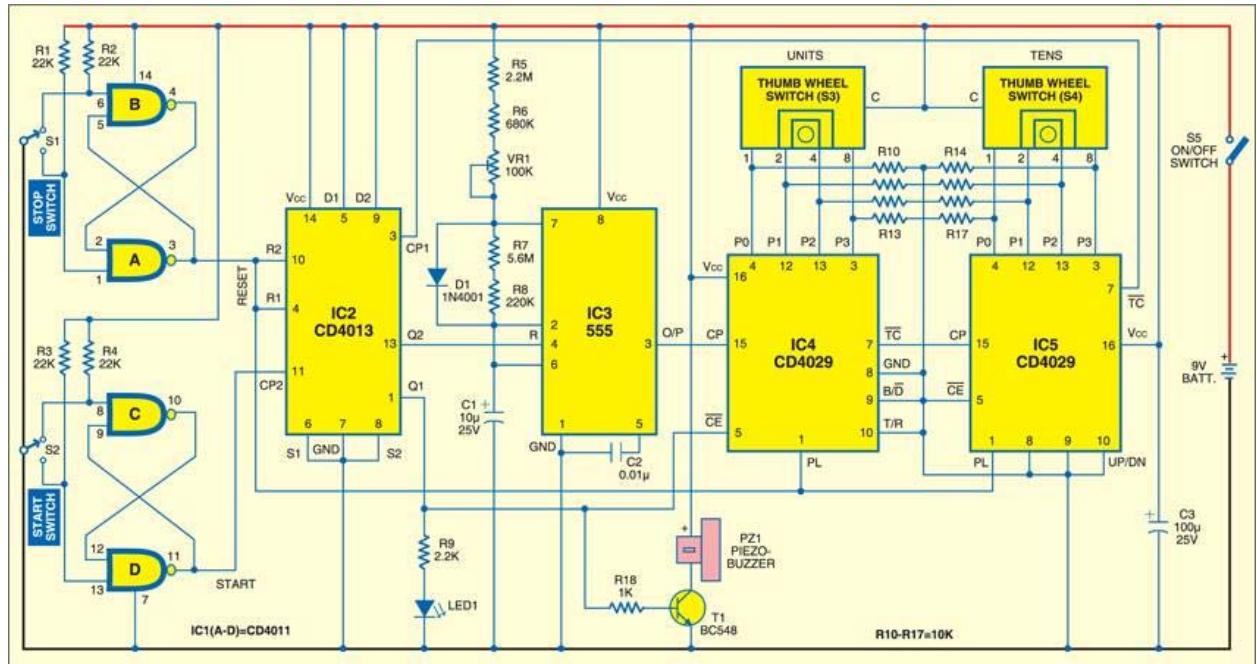
228. LED Illumination for Refrigerators

The incandescent lamp provided inside the refrigerators glows whenever we open the door. It suffers from several disadvantages. These problems could be overcome by using a distributed array of LEDs with battery back-up, which provides shadowless light and cool operation [232].



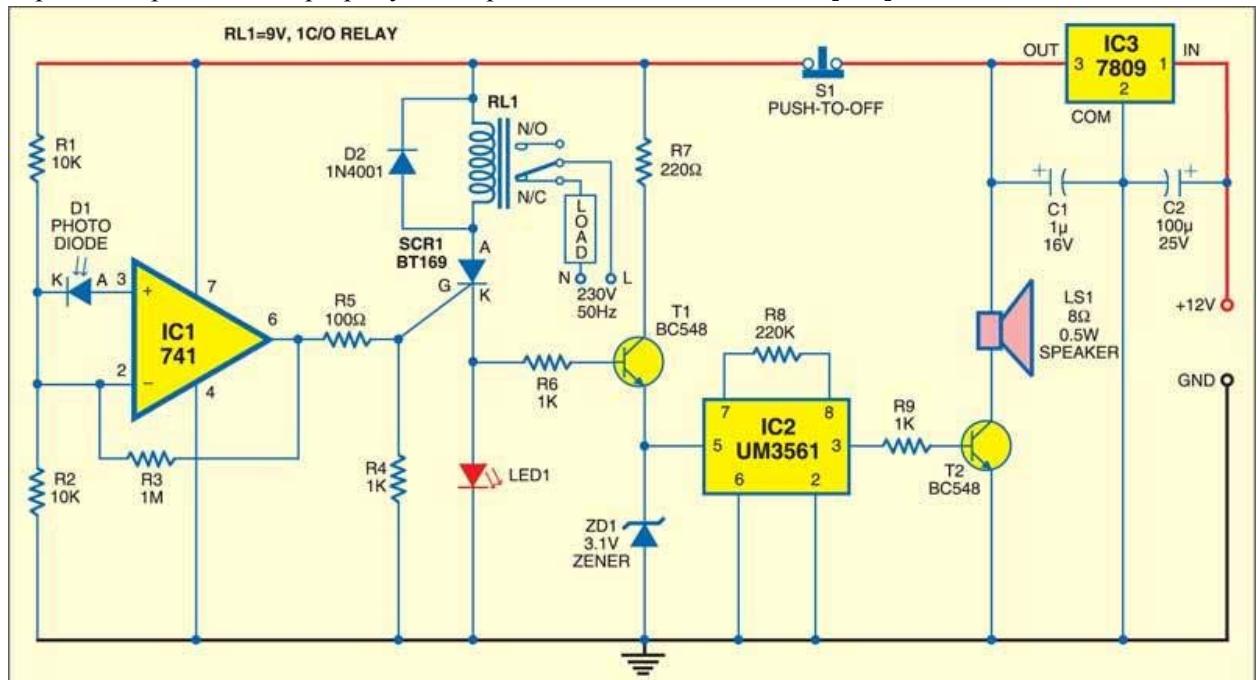
229. Electronic Reminder

This easy-to-build electronic alarm will remind you of an important task after a preset time. It is particularly useful for housewives and busy professionals. All you have to do is set the time in minute with the help of two thumbwheel switches (S3 and S4) and press and release start switch. Precisely after the time set by you is over, there is an audio as well as visual indication to remind you that the time you set has elapsed. The gadget is portable and operates off a 9V battery [234].



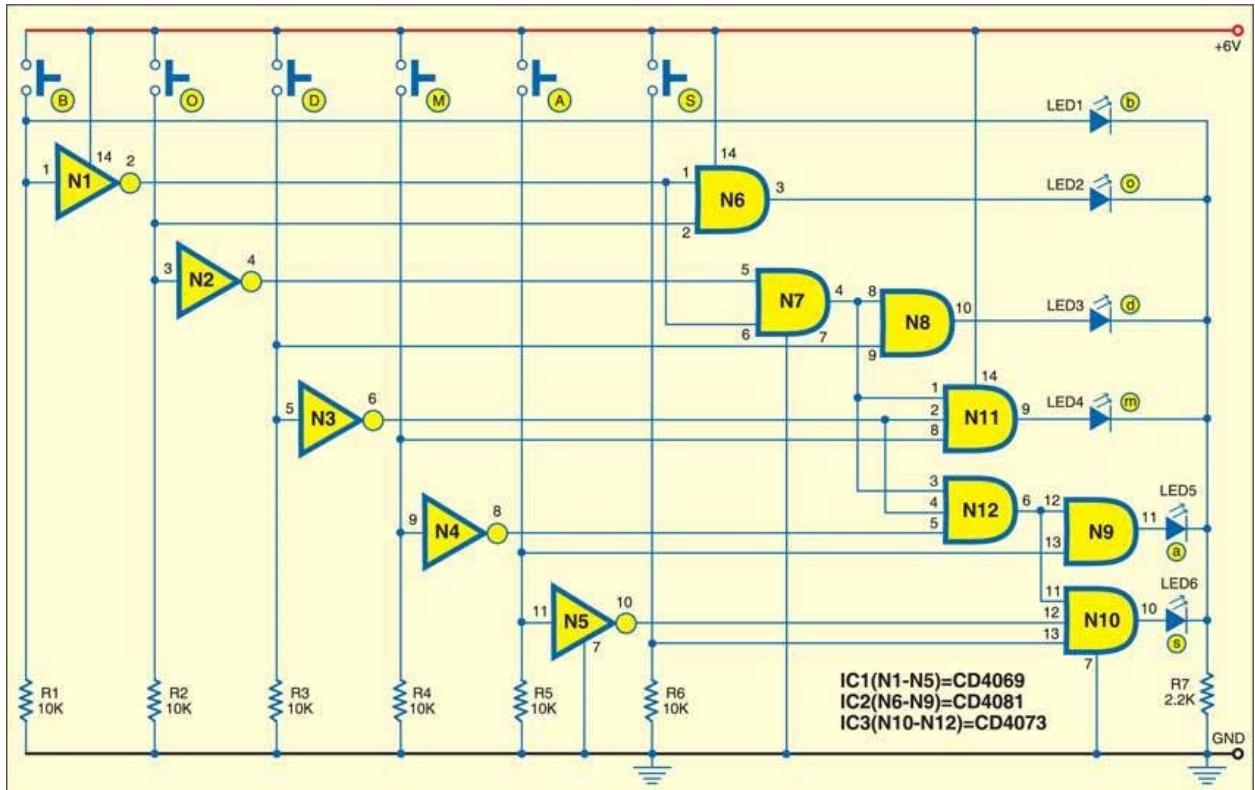
230. Photodiode-Based Fire Detector

This ultra-sensitive fire sensor protects your electronic devices like computer and television set. It uses a photodiode as the fire sensor and sounds an alarm immediately on sensing a spark or fire in the power supply section of the instrument and instantly cuts off the power supply. The circuit exploits the photovoltaic property of the photodiodes to sense the fire [235].



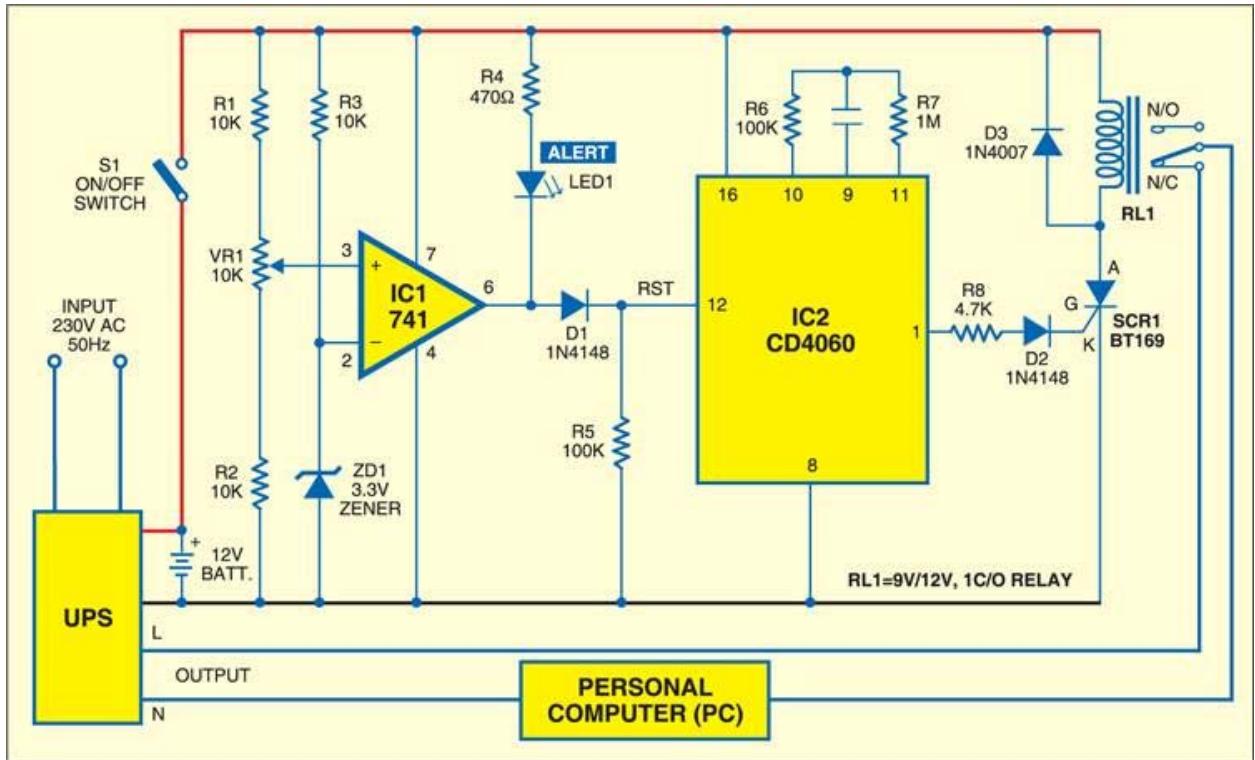
231. Bodmas Rule

The term ‘BODMAS’ is an acronym for ‘bracket,’ ‘of’, ‘division,’ ‘multiplication,’ ‘addition’ and ‘subtraction’ and the ‘BODMAS rule’ is a mnemonic for the hierarchy of various arithmetical operators. A mathematical expression may involve a number of operators, but only one of them must be carried out first. The order of priority, as we are familiar from school days, follows: ‘Bracket’ followed by ‘of,’ ‘division,’ ‘multiplication,’ ‘addition’ and then ‘subtraction’ in that order [236].



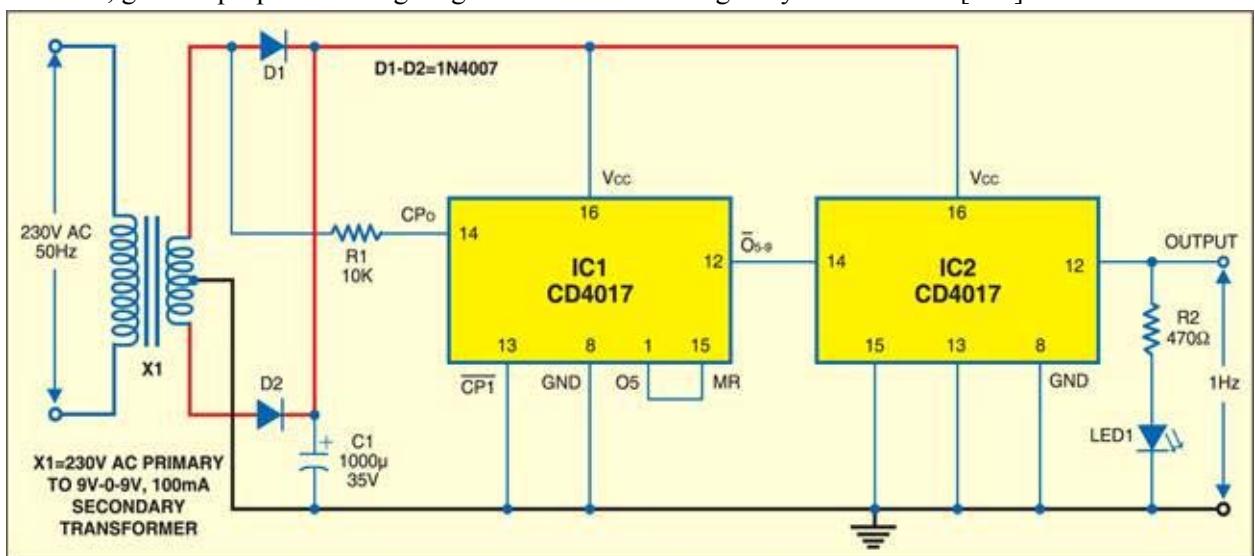
232. Circuit for UPS to Hibernate PC

Most of the low-power UPS systems available in the market do not have the facility to shut down the PC before they turn off automatically due to low battery. Some of them have the facility but they require software for the same [237].



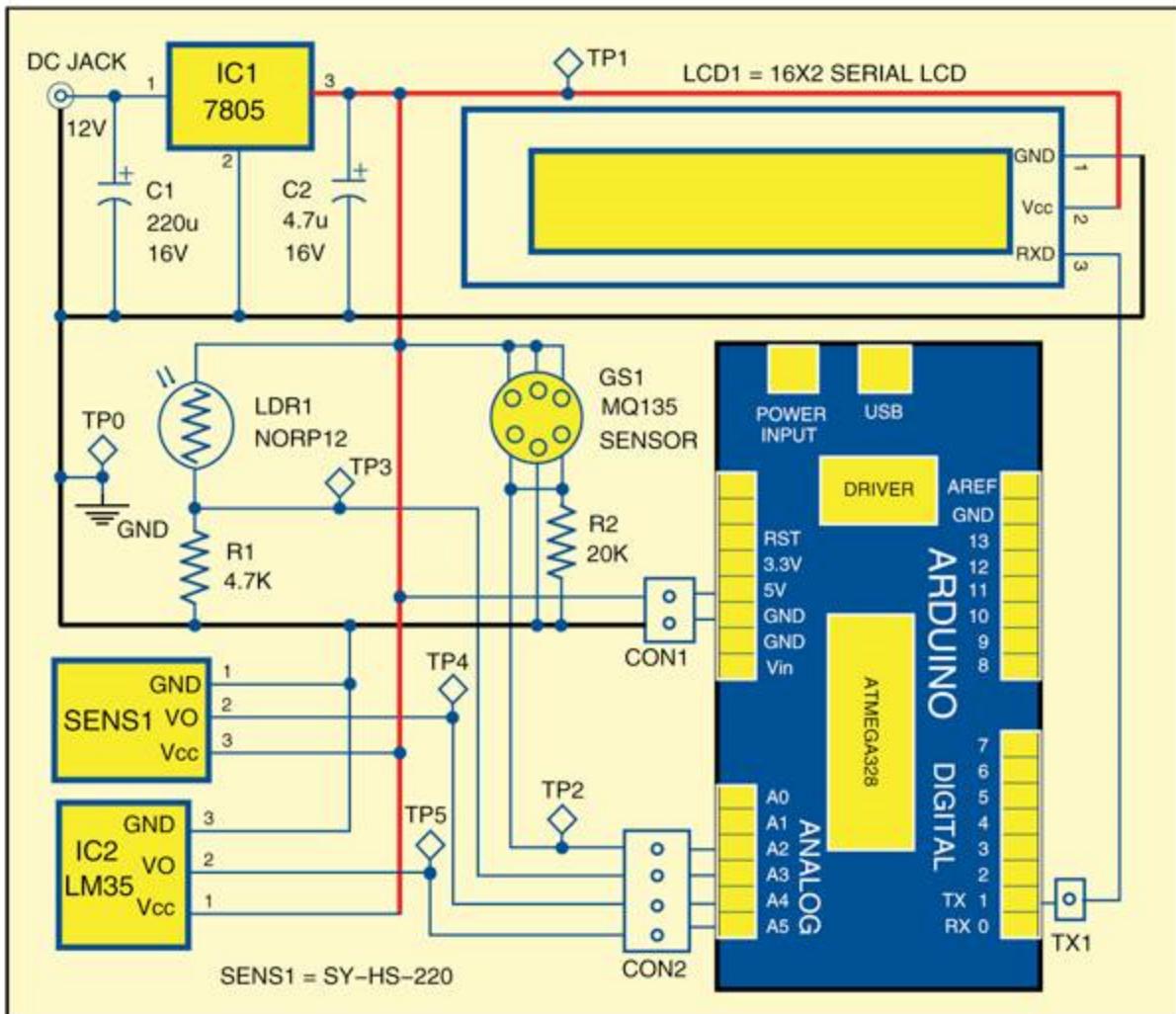
233. Accurate 1Hz Generator

Accurate 1Hz square wave pulses are required in stopwatches and other digital circuits. Here is a low-cost, general-purpose 1Hz signal generator without using a crystal oscillator [232].



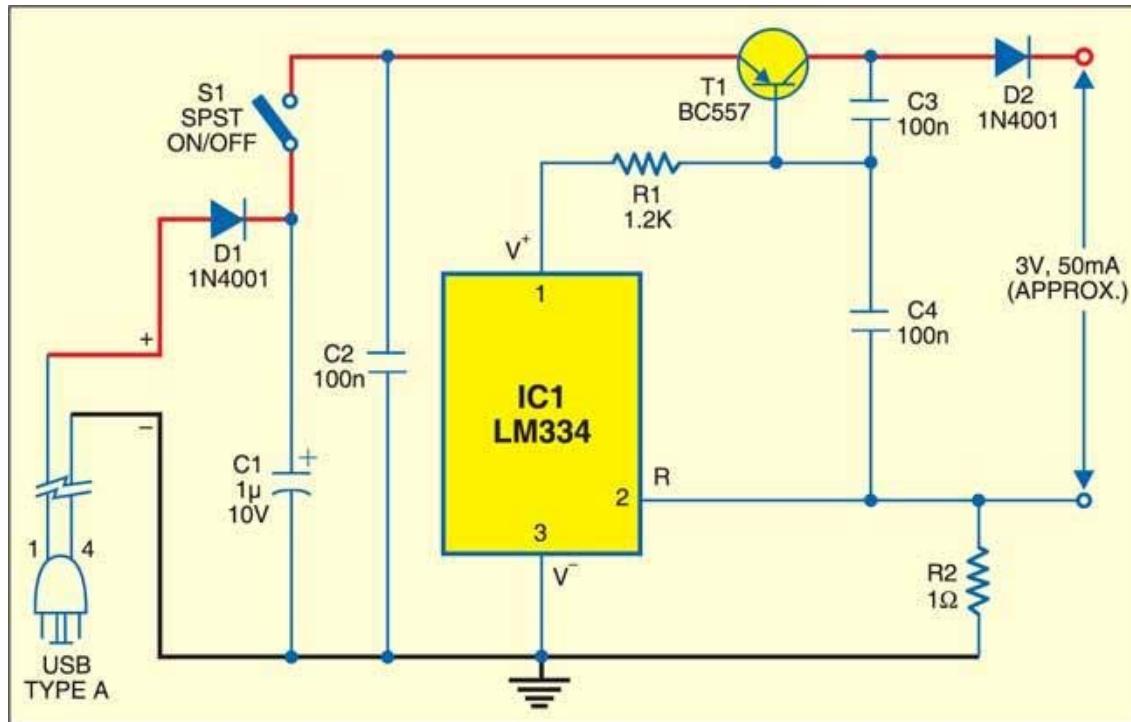
234. Environment Monitoring System Using Arduino

A comfortable environment can increase the productivity multi-folds. So it is important that the environment variables, such as temperature, relative humidity, dew point, light intensity and air quality (gas/smoke), are continuously monitored and corresponding systems adjusted to maintain a comfortable working environment [236].



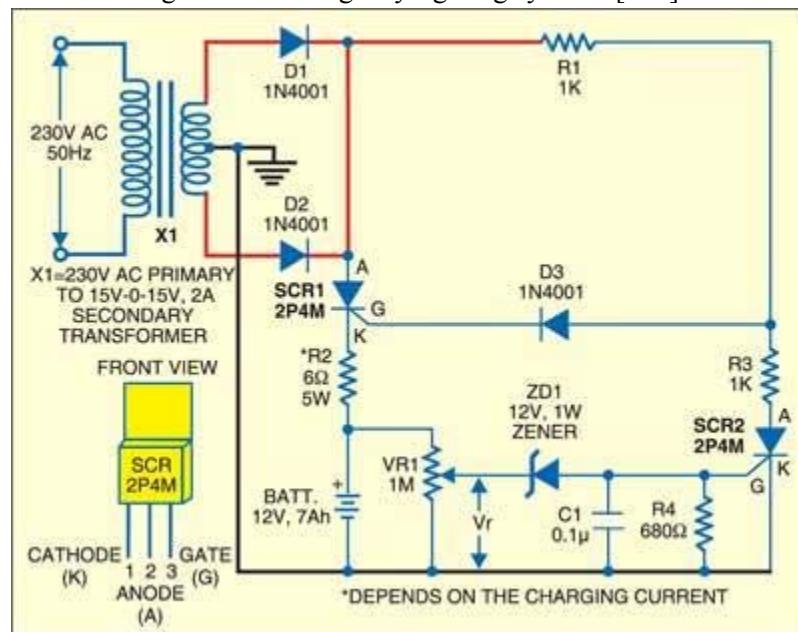
235. 3V PC Adaptor

Plug this circuit into the available USB output port of your PC to get 50mA, 3V DC. So it can be used to recharge, for instance, two NiCd cells (1.2Vx2) of a portable music player system [237].



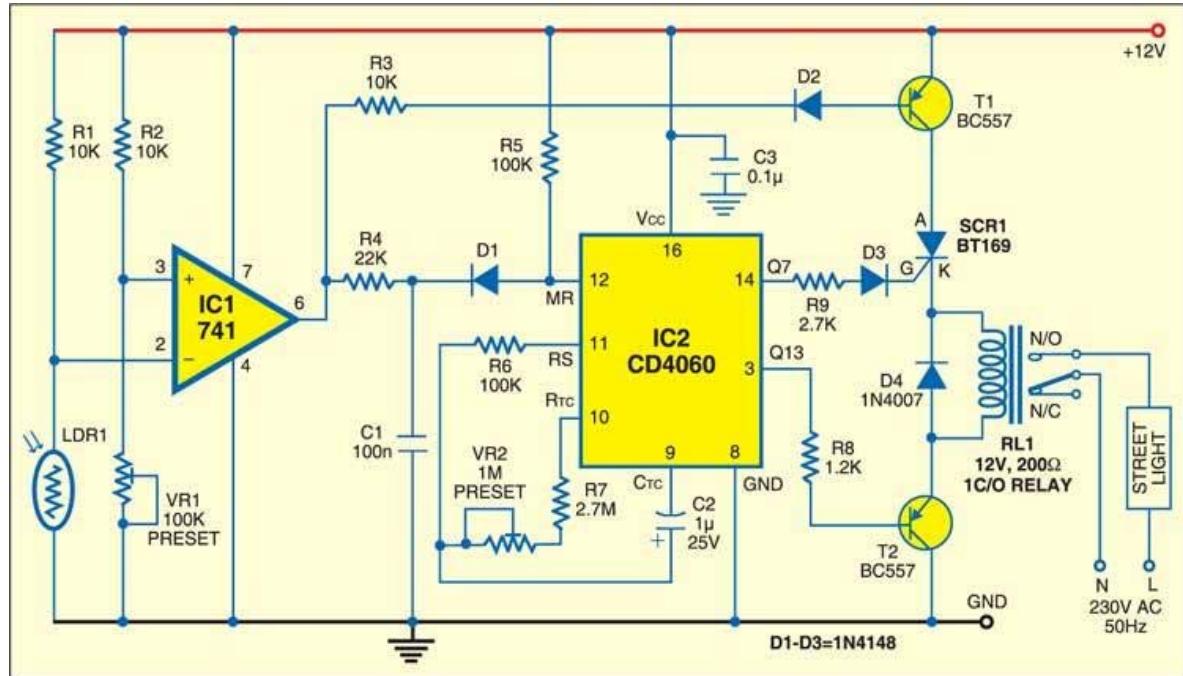
236. Low-Cost Battery Charger

Here is a very simple and low-cost charger for 12V, 7Ah lead-acid batteries. It can also be used for powering automobile engines and emergency lighting systems [238].



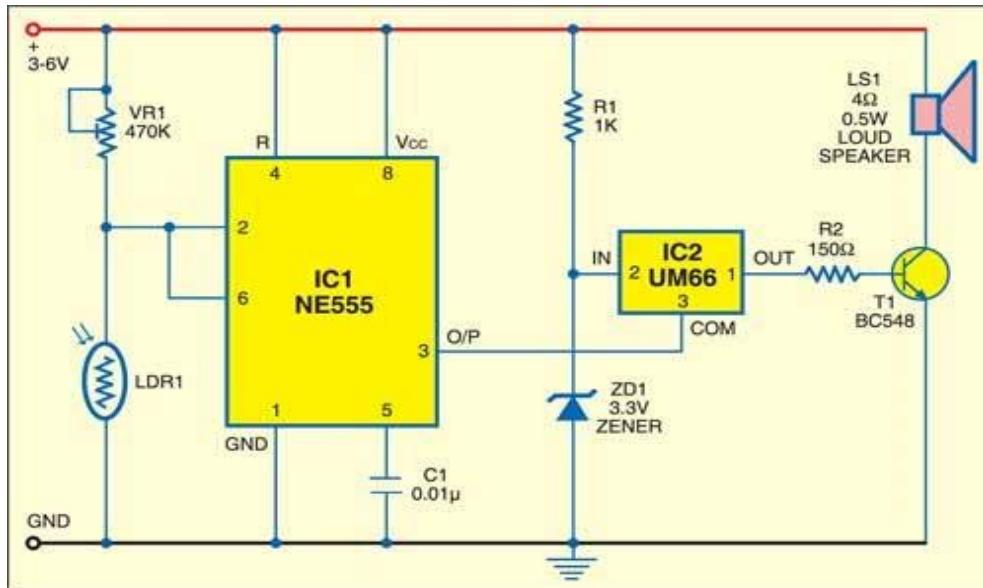
237. Street Light Controller

Two of the problems commonly associated with street lights are false triggering due to slight variation in the intensity of ambient light and no control over switching action. Here is a simple switching circuit for street lights that overcomes these problems [235].



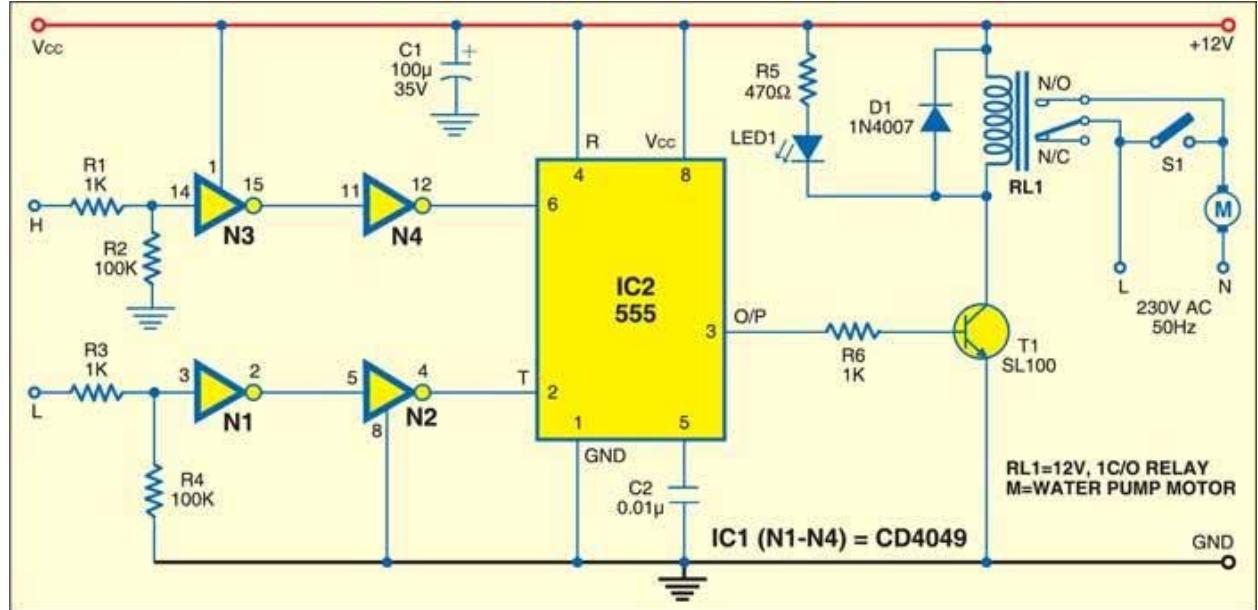
238. Light-Operated Doorbell

Light-dependent switches are used in automatic hand-dryers and flushers in toilets. Here is a simple light-operated switch that works in normal light also. You can affix it on the main door of your house to work as an automatic doorbell or a thief alarm. The bell rings as soon as someone's shadow falls on the sensor of this device [236].



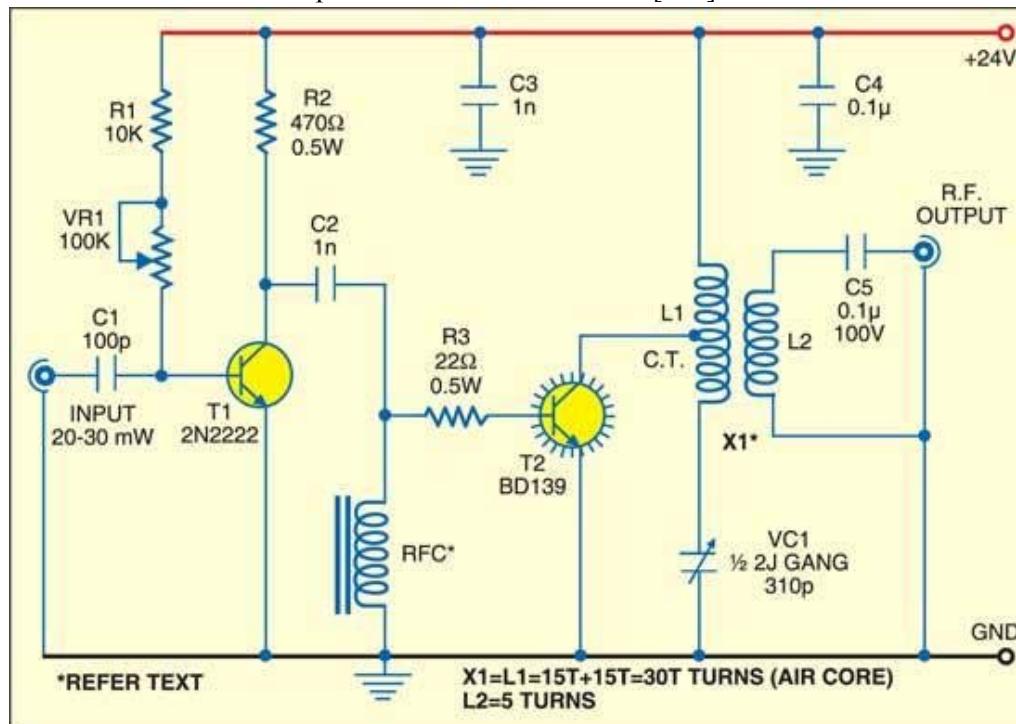
239. Simple Automatic Water-Level Controller

Water-level controllers are common nowadays. The one described here is built around timer NE555 and inverter buffer CMOS IC CD4049. It uses readily-available, low-cost components, and is easy to build and install on the over-head tank (OHT) to prevent wastage of water [237].



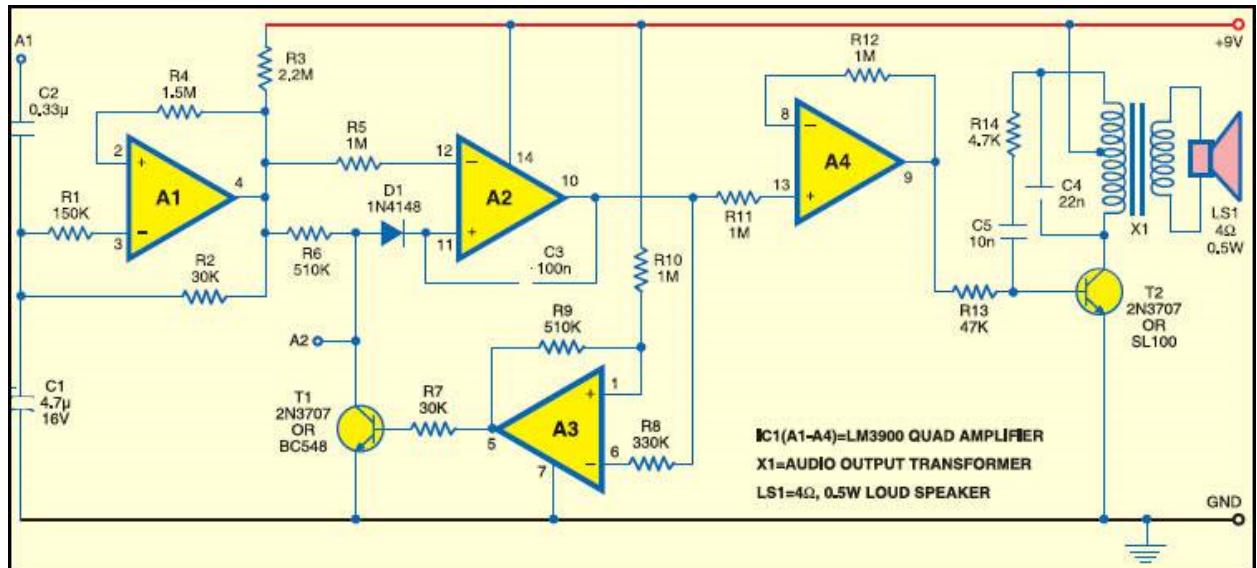
240. Simple HF Power Amplifier

Here is an inexpensive but powerful RF power amplifier for the 40m (7MHz) band. The circuit accepts only 20-30mW RF power and amplifies it to the wattage level. So its input can be directly connected to a VFO and the output can be fed to an antenna [238].



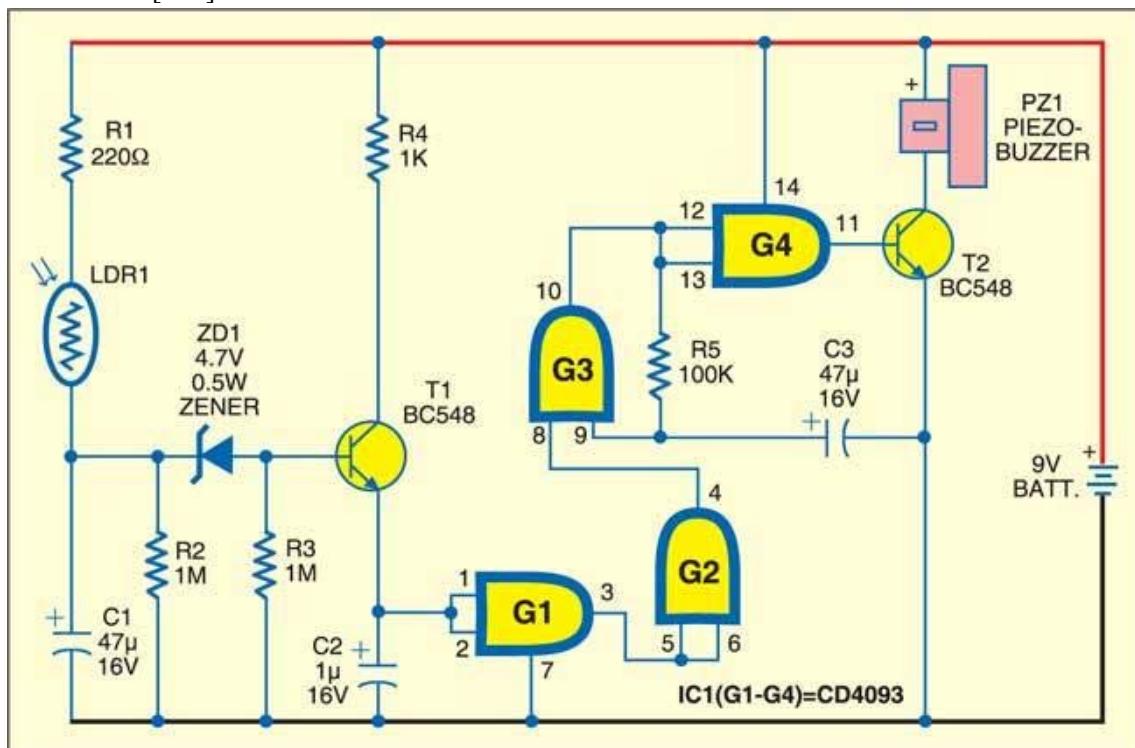
241. Electronic Horn

Here's a simple circuit of an electronic horn that is built around quadruple op-amp IC LM3900 (IC1). IC LM3900 has four independent op-amps (A1 through A4) with a large output voltage swing. It can work at up to 32V DC [239].



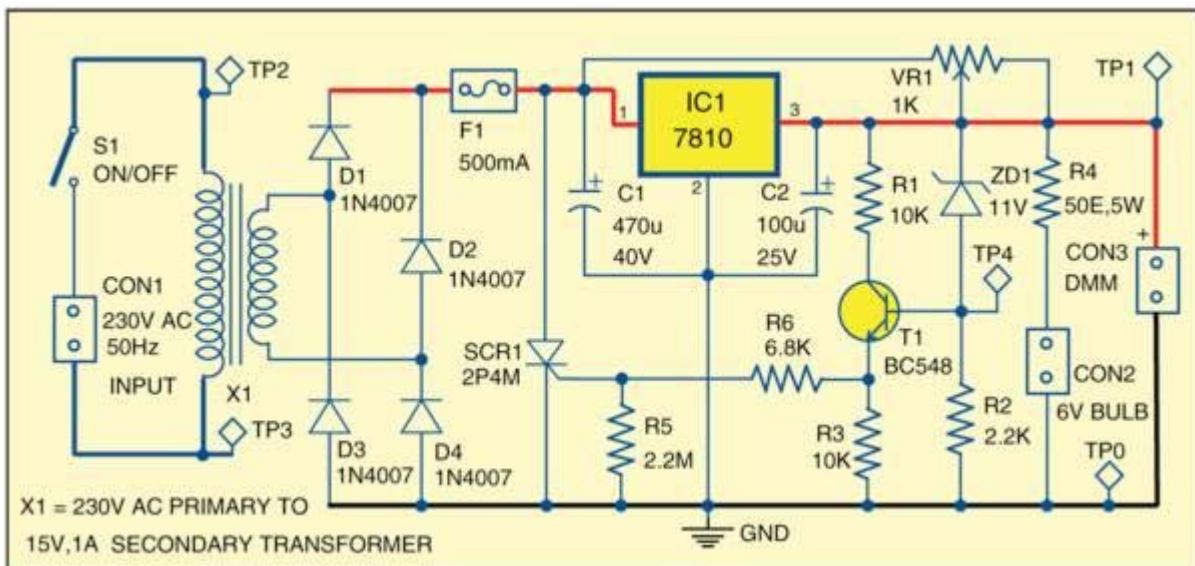
242. Locker Guard

Protect your valuables from burglary using this simple circuit. It generates warning beeps when someone attempts to open the locked safe. The warning alarm sounds at an interval of a few seconds, so it is not annoying. Even after closing the door, the alarm will continue sounding for a few seconds [240].



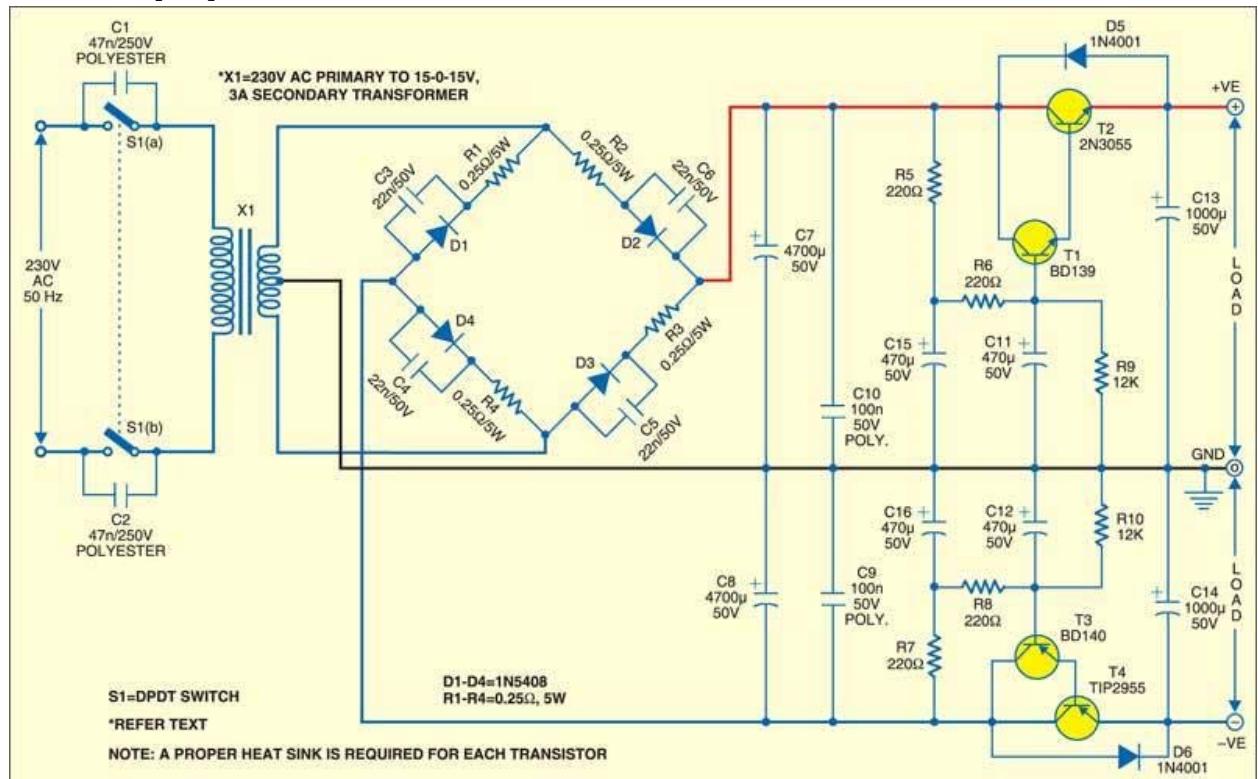
243. Demo Circuit for Over-Voltage Protection

Over-voltage protection circuits are used to protect voltage-sensitive loads. Voltage transients may occur due to a number of reasons such as transformer switching, load switching, and short/open circuit in rectifier and regulator circuit. Such transients can affect proper functioning of an electronic circuit or even damage it. Hence it is necessary to use an over-voltage protection circuit to protect expensive loads against all the sources of voltage transients [241].



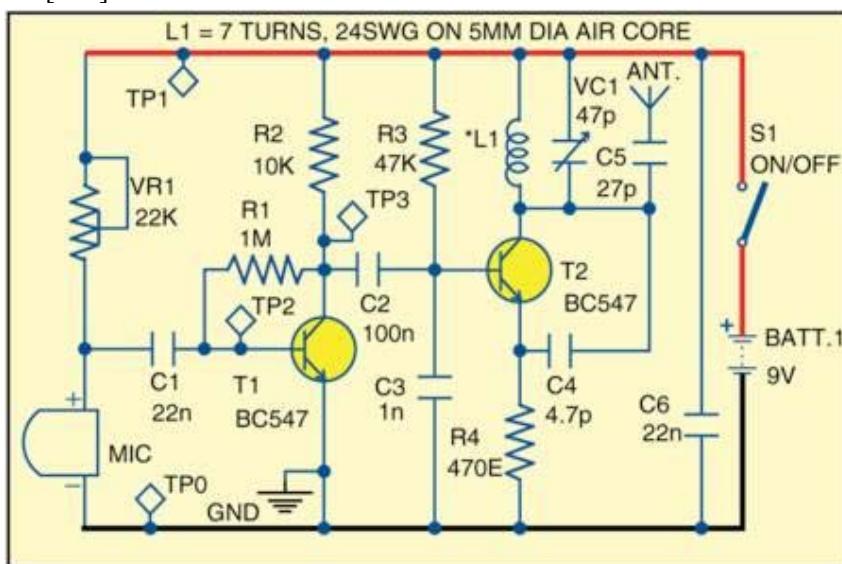
244. Capacitance-Multiplier Power Supply

Here is the circuit of a highly efficient power supply with regulation that uses a centre-tapped transformer [242].



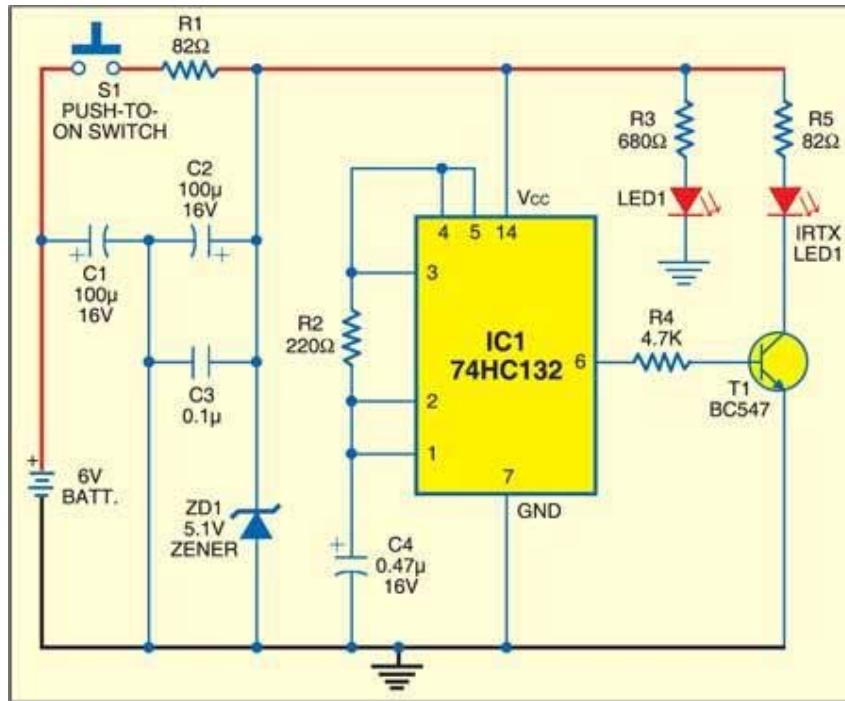
245. Wireless PA for Classrooms

In large classrooms, many a times the teacher's voice is not audible to students in the back rows. So the teacher have to literally shout to be heard by every student. Presented here is a circuit that can act as a wireless speech-aid for teachers so that their voice reaches every student even in a large classroom [243].



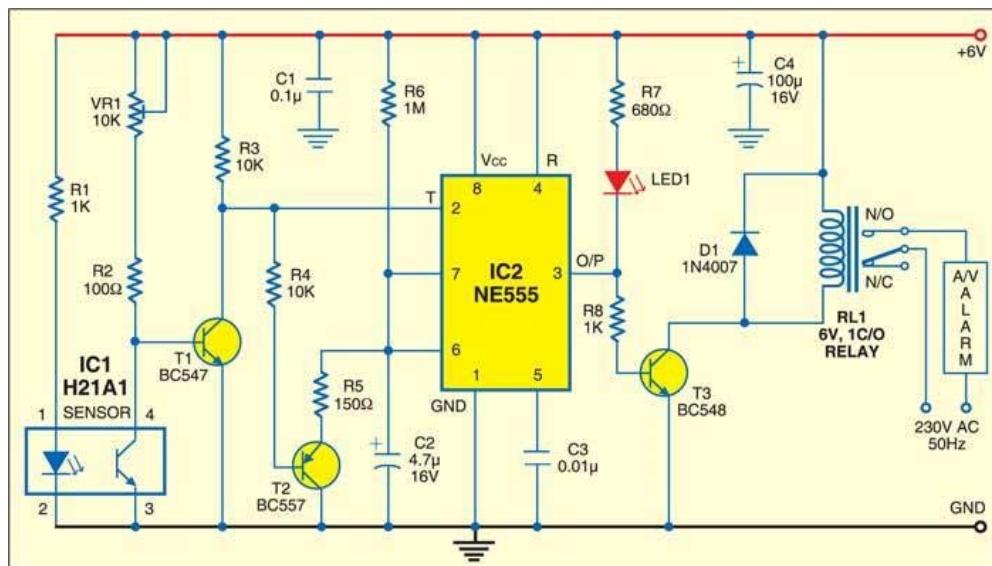
246. Electronic Door Key

This circuit is basically a short-range, infrared remote-controlled electromagnetic relay driver. It can be used to control door motors or solenoid-based locks using a compact and handy remote handset [244].

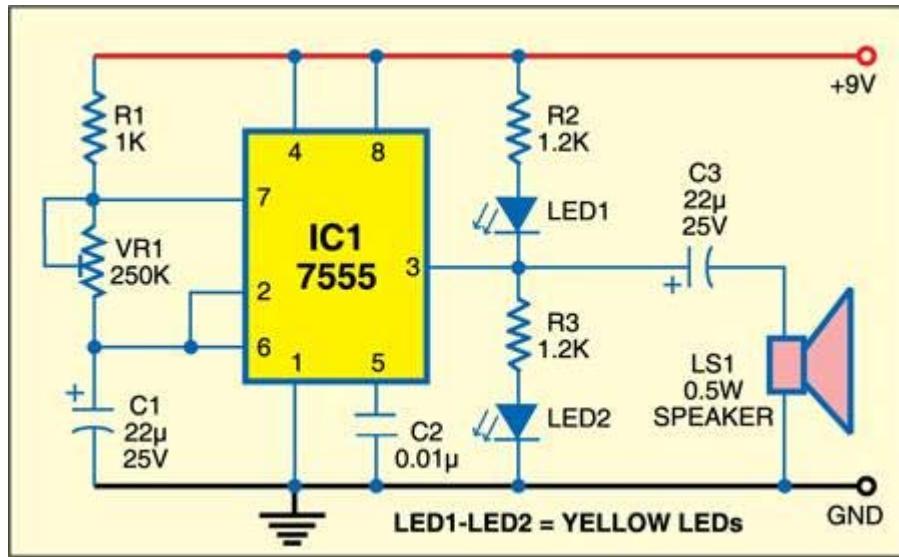


247. Optical Smoke Detector

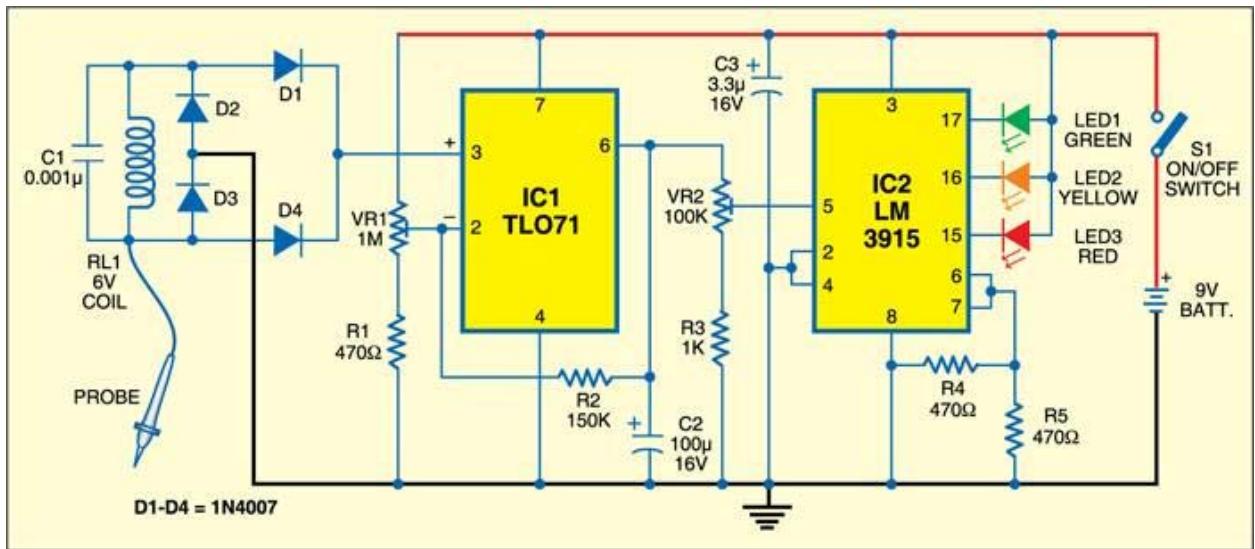
This optical smoke detector uses a low-cost, readily-available, slotted, through-scan, infrared photo-switch. When smoke is detected, the relay energises to activate the audio/visual warning alarm [245].



248. Clock Tick-Tock Sound Generator & LED Pendulum [246]

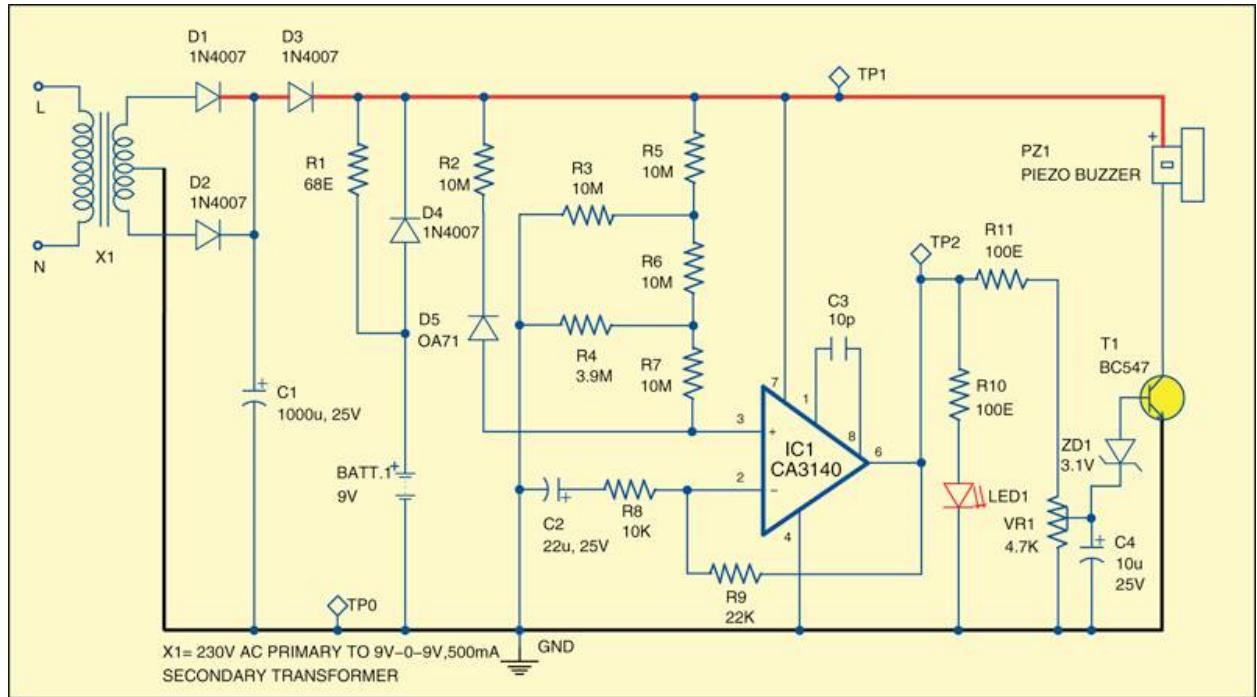


249. Earth Leakage Tester [247]

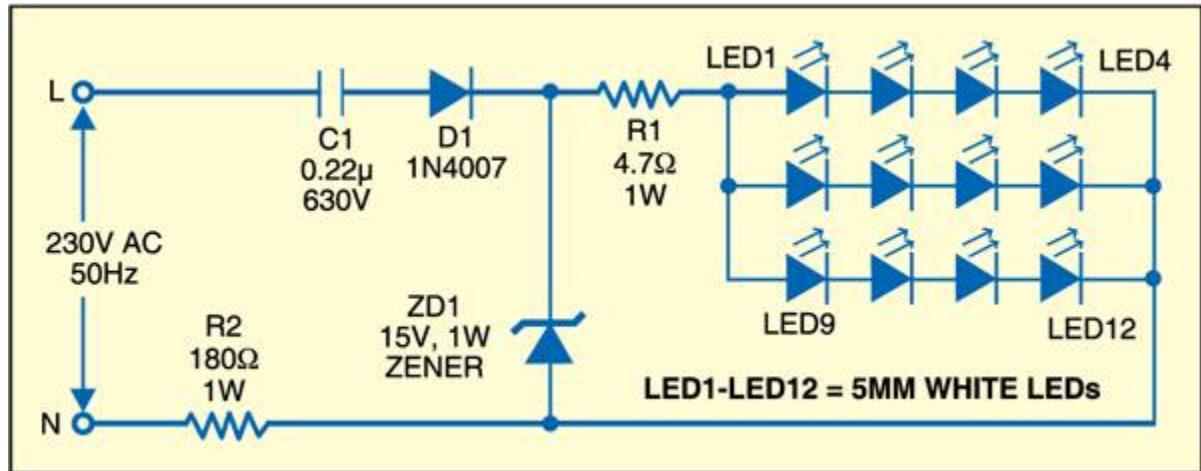


250. Signal Diode-Based Fire alarm

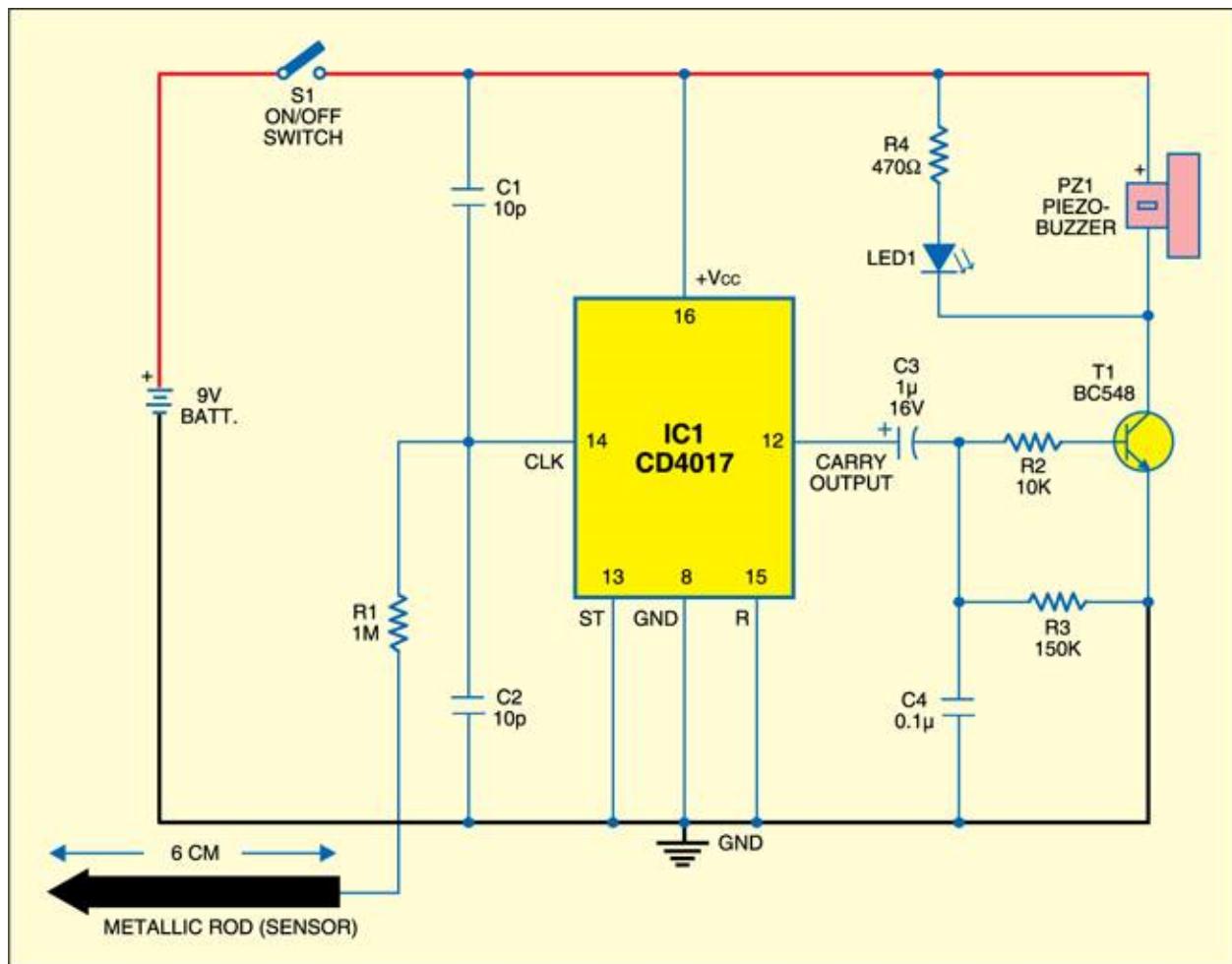
A simple signal diode can be used to build a highly sensitive firealarm. Silicon diodes like OA71 and 1N34 respond to infrared radiation and heat from fireby generating reverse current across their terminals. In reverse-bias mode, this effect is more significant. Typically, for each degree rise in temperature, the diode generates 2 mV. This characteristic is exploited in this circuit to sense fire.The circuit can detect firefrom a distance of up to around 30 cm [248].



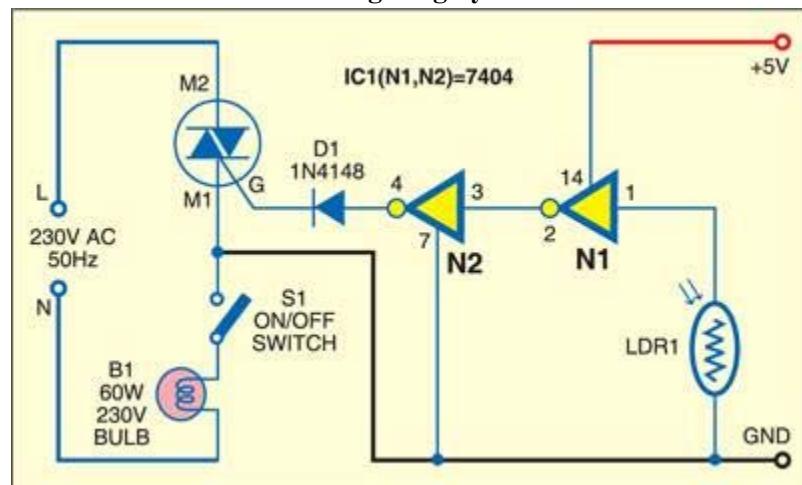
251. Night Lamps



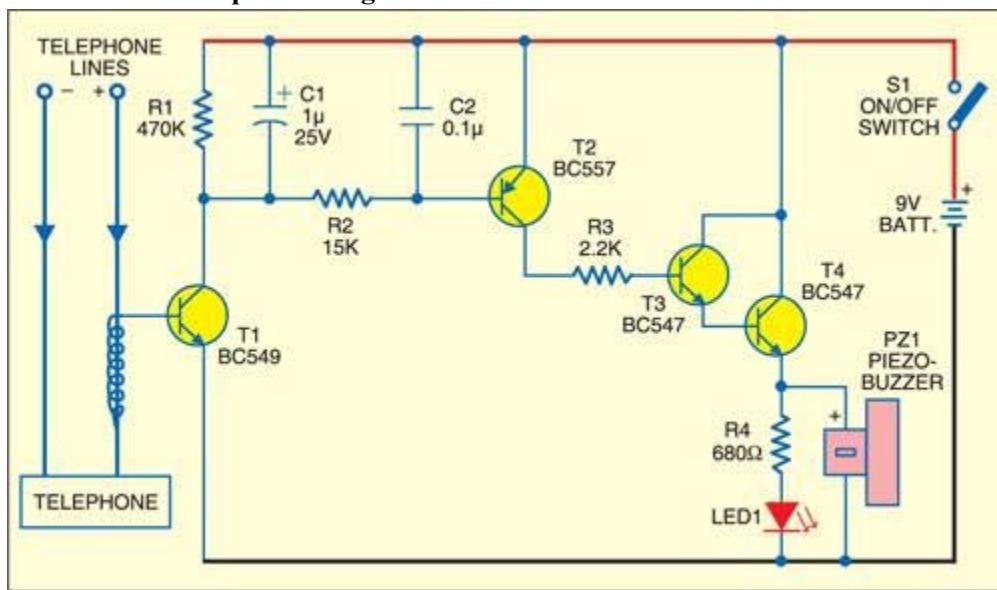
252. Continuity Tester With A Chirping Sound



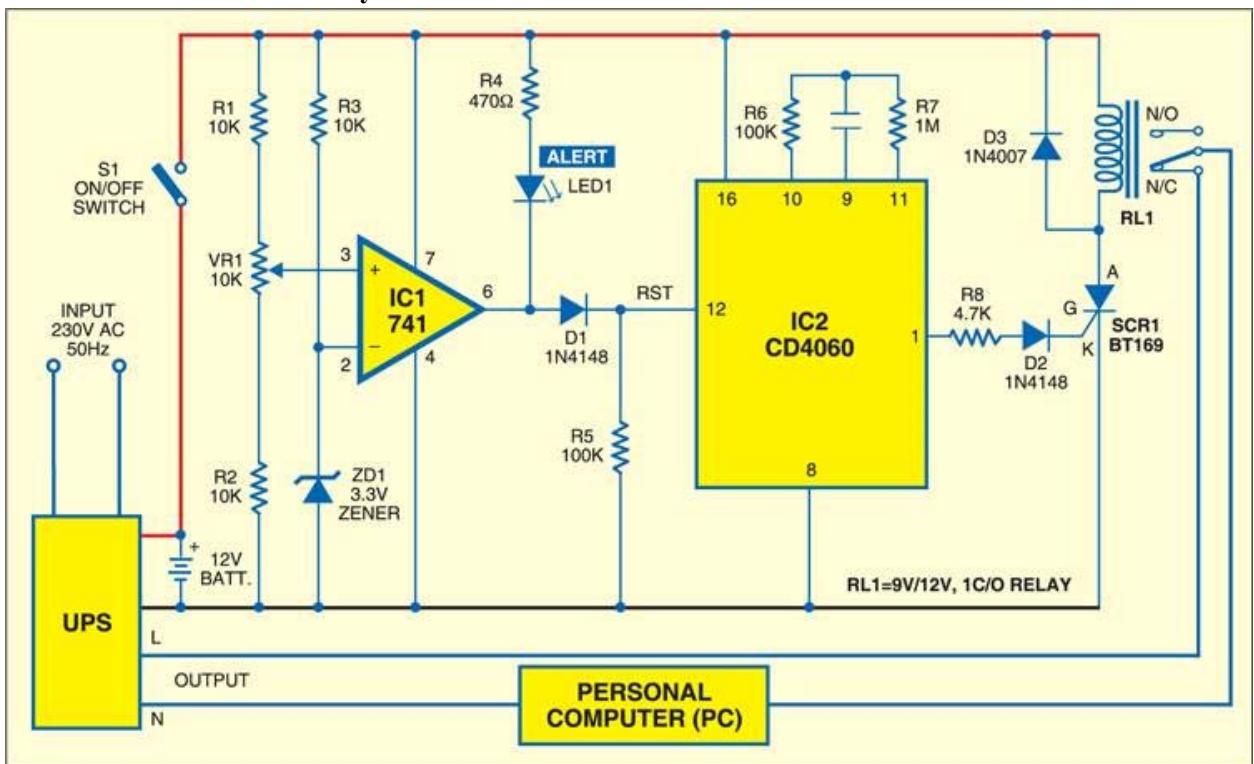
253. Automatic Darkness-Controlled Lighting System



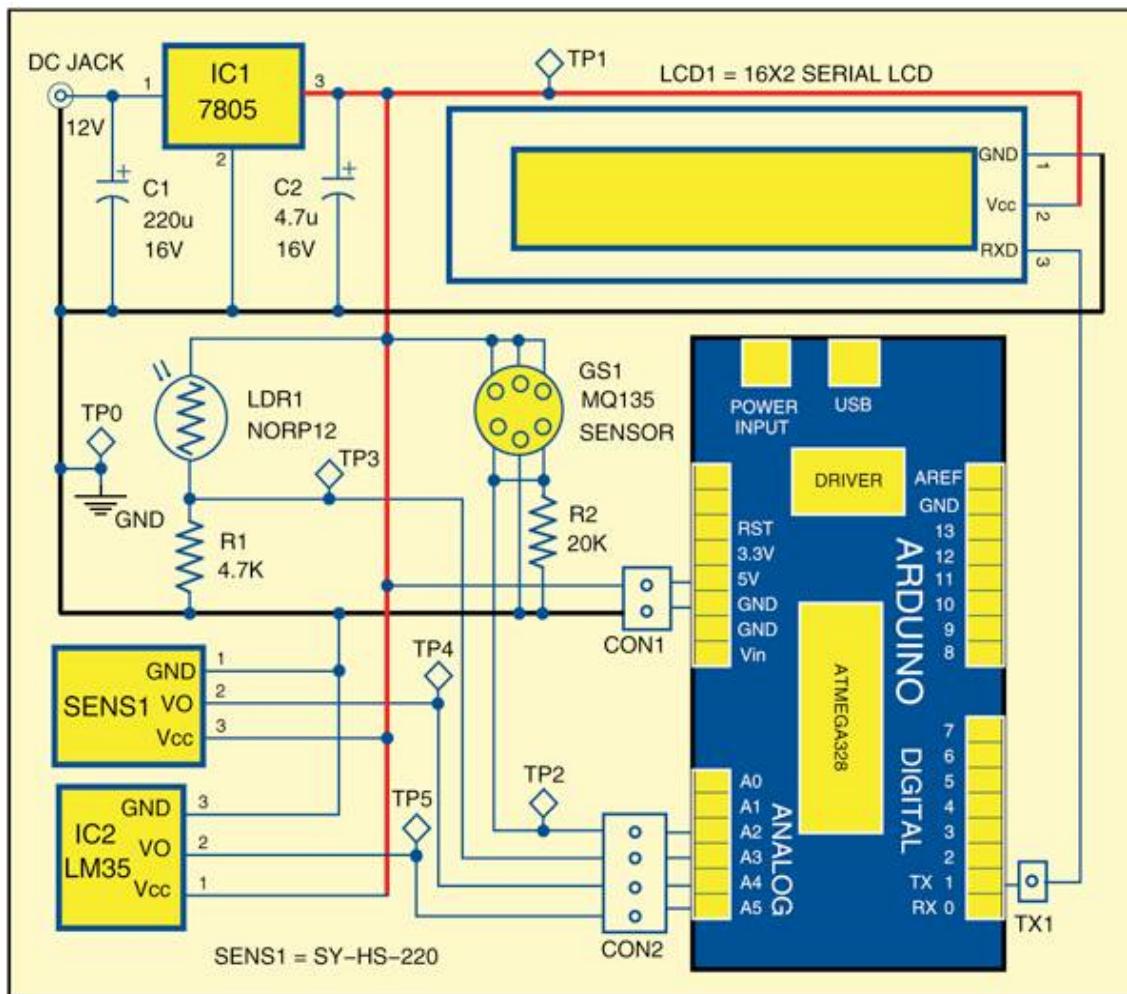
254. Contactless Telephone Ringer



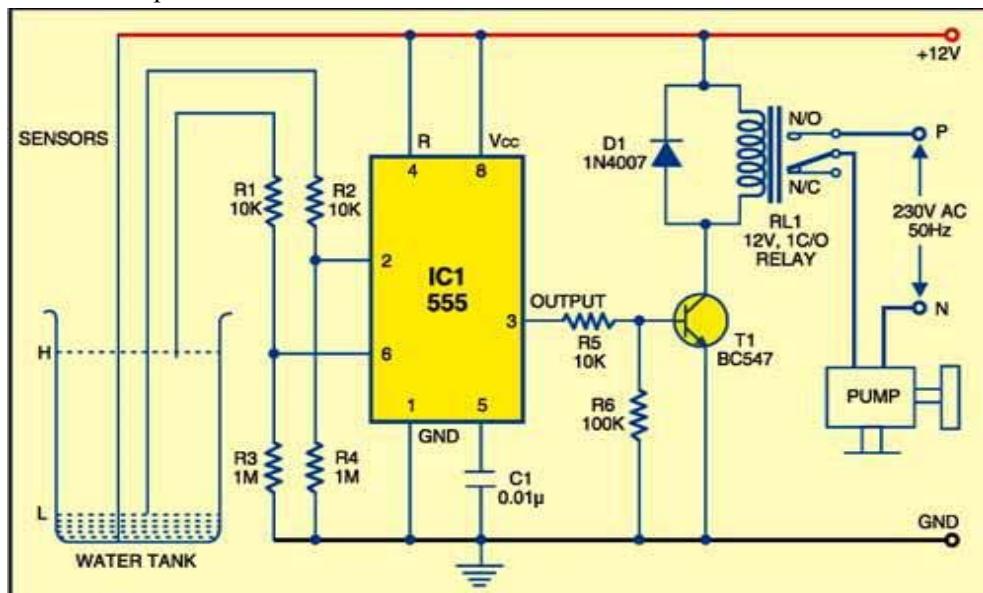
255. Circuit for UPS to Hibernate PC



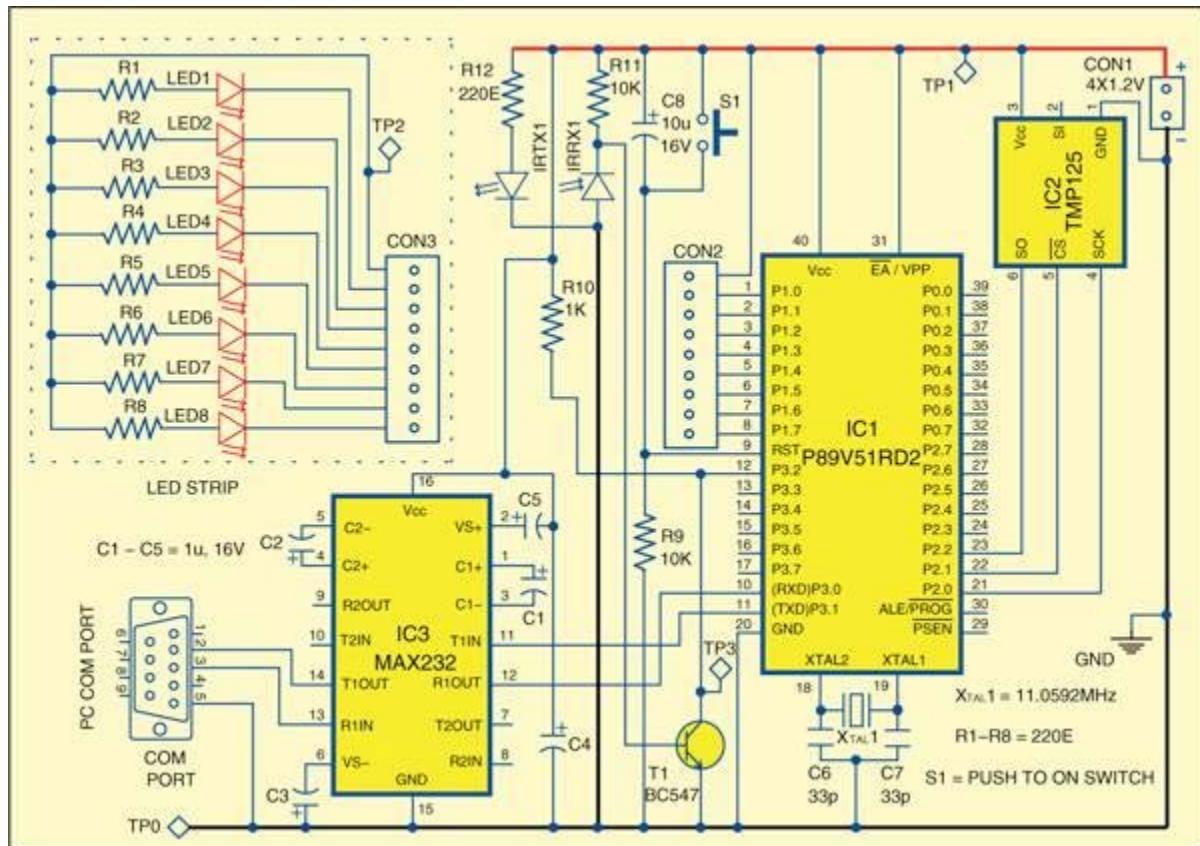
256. Variable Bench Power Supply With LCD and Monitor Display



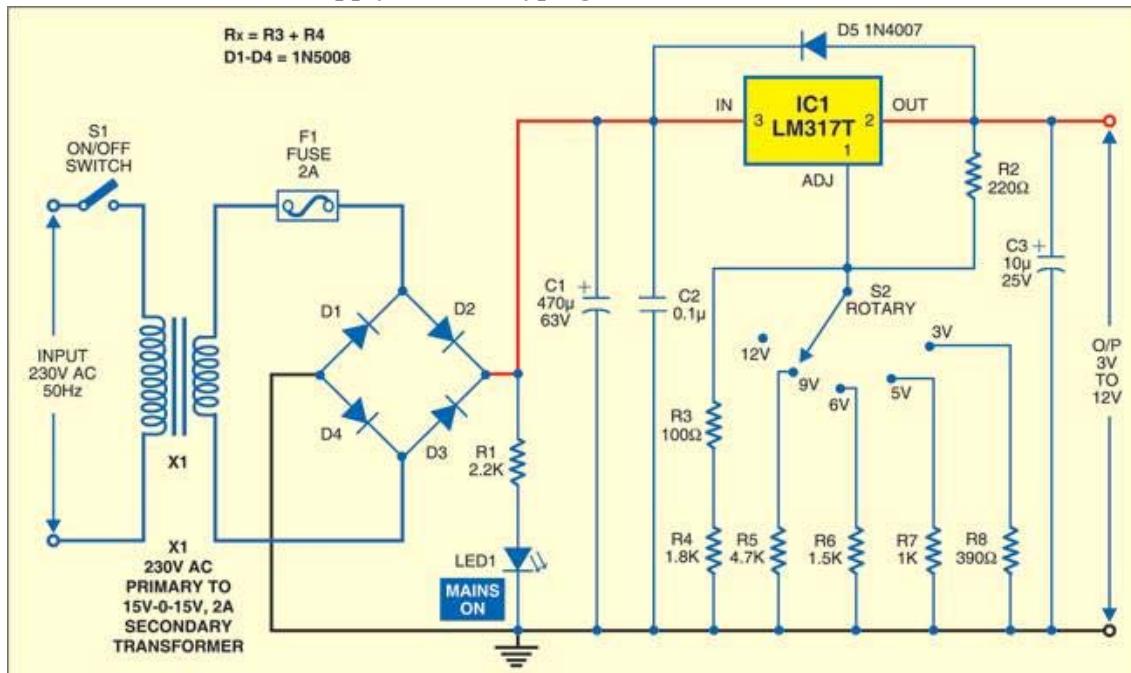
257. Water Pump Controller



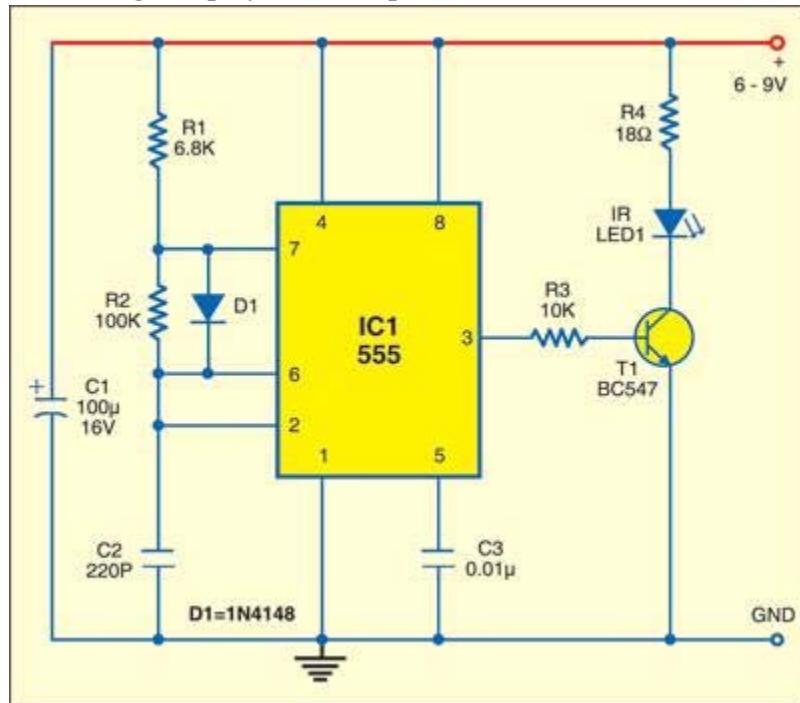
258. Propeller Message Display with Temperature Indicator



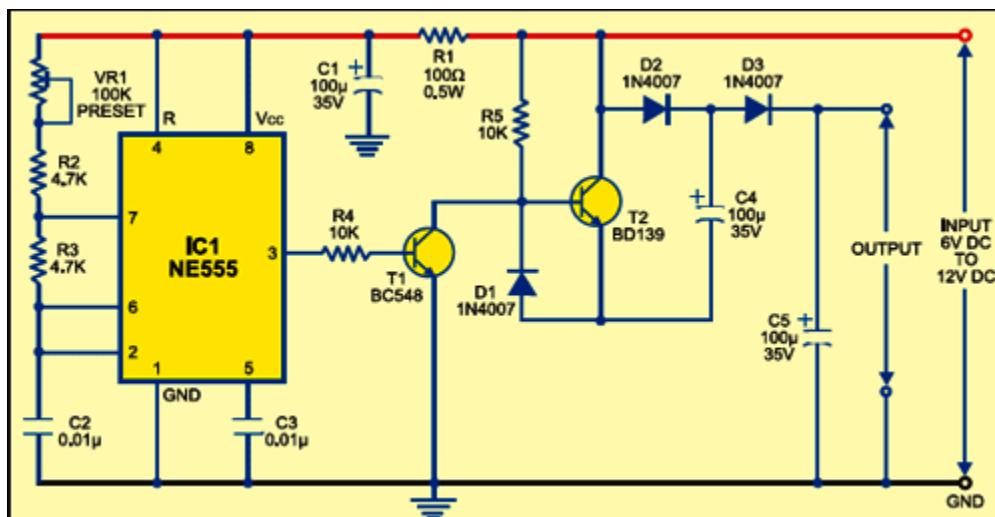
259. Stabilised Power Supply for Prototyping



260. Propeller Message Display with Temperature Indicator



261. LOW-POWER VOLTAGE DOUBLER



262. Wind sound Generator

Using this simple circuit, one can generate the sound of wind. The circuit is basically an astable multivibrator build around two NPN transistors.

By adjusting the 1M potentiometer (VR1), the sound can be changed from that of wind to storm, sound of sea, hiss of escaping gas from a container through a small hole etc. A 9-Volt or 6-volt unregulated power supply is enough. However, a battery may be used instead. The output sound will be slightly changed. The prototype has been successfully tested with the given power supply. Also an 8-ohm, 5cm, low wattage speaker is recommended.

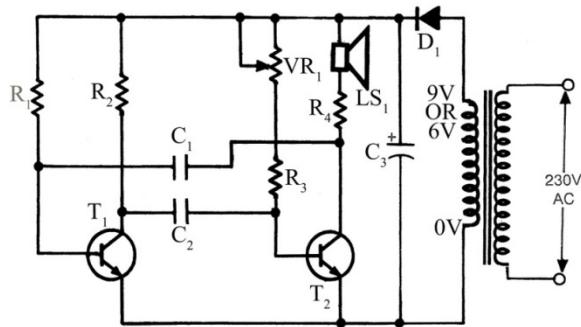


Figure 1: Circuit Diagram of Wind Sound Generator

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

$R_1 = 1 \text{ M}\Omega$; $R_2 = 4.7 \text{ K}\Omega$; $R_3 = 100 \text{ K}\Omega$; $R_4 = 10 \Omega$; $VR_1 = 1 \text{ M}\Omega$

Capacitors $C_1 = 0.01 \mu\text{F}$; $C_2 = 0.0033 \mu\text{F}$; $C_3 = 1000 \mu\text{F}/16\text{V}$

Semiconductors $T_1, T_2 = \text{BC548}$; $D_1 = \text{1N4001}$

Miscellaneous $X_1 = 230\text{V AC Primary To } 9\text{V/6V} - 0\text{V AC Secondary}$; $LS_1 = 8\Omega$ speaker

263. White / LF Noise Generator

Every musician today is in need of a noise source, particularly those who practice with a group or use a synthesizer. The white noise generator gives an output to be fed to an amplifier. The white noise generated by the 12V zener diode is amplified 200 times along with the noise of the noisy 741 IC (IC1). The output is thus very noisy with plenty of white noise.

The output of IC1 is given to a low pass filter which cuts off high frequencies. Point A is connected to amplifier IC2. The feedback network of IC2 includes a $0.15 \mu\text{F}$ capacitor which reduces the gain at high frequencies. The $0.001 \mu\text{F}$ capacitor at the output of IC2 also loads the output at high frequencies and reduce them. Thus the resultant output has a large amount of low frequency (LF) noise. A small amount of white noise due to the IC itself is produced at the output, but it can be ignored. Point B is an artificial center point created for IC1 and IC2. Point C is connected to the capacitor which reduce the gain of IC2 at high frequencies.

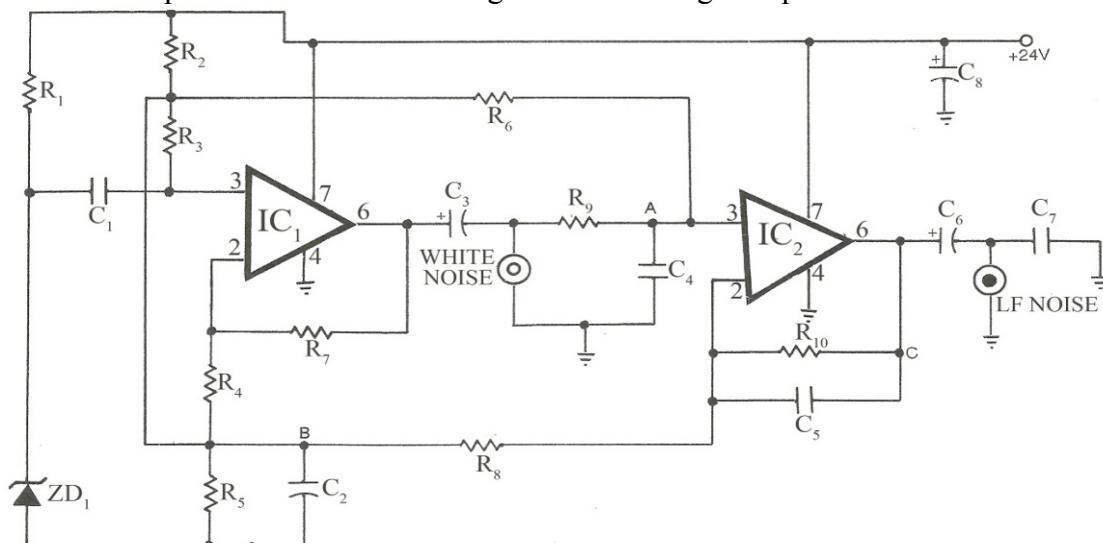


Figure 1: Circuit Diagram of White/IF Noise Generator

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

$R_1 = 470 \text{ k}\Omega$; $R_2, R_5, R_8, R_9 = 10 \text{ k}\Omega$; $R_3, R_6, R_{10} = 100 \text{ k}\Omega$; $R_4 = 4.7 \text{ k}\Omega$; $R_7 = 1 \text{ M}\Omega$

Capacitors $C_1 = 0.47 \mu\text{F}$; $C_2 = 100 \mu\text{F}/10\text{V}$; $C_3, C_6 = 1 \mu\text{F}/16\text{V}$; $C_4 = 0.15 \mu\text{F}$; $C_5 = 0.015 \mu\text{F}$; $C_7 = 0.001 \mu\text{F}$; $C_8 = 100 \mu\text{F}/25\text{V}$

Semiconductors $IC_1, IC_2 = 741$, $ZD_1 = 12\text{V } 400\text{mW}$

264. Universal Battery Tester

To recognize the battery whether it is working or not is very difficult. Generally voltmeter is employed for checking purpose of state of battery. Now, here is very simple circuit utilized to check the state of battery.

Circuit Description

The entire circuit of universal battery tester is build around dual comparator IC TL072 (IC1) followed by other component. The two independent comparator is used here as operational amplifier. The inverting pin of these two operational amplifiers is fed through potential divider network made from resistor R_1 and R_3 . Rest of the component is utilized to maintain threshold voltage.

State of LED

Glowing RED LED:- Battery is fully charged

Glowing GREEN LED:- Battery is usable

Glowing RED LED:- Need charge or it is not usable.

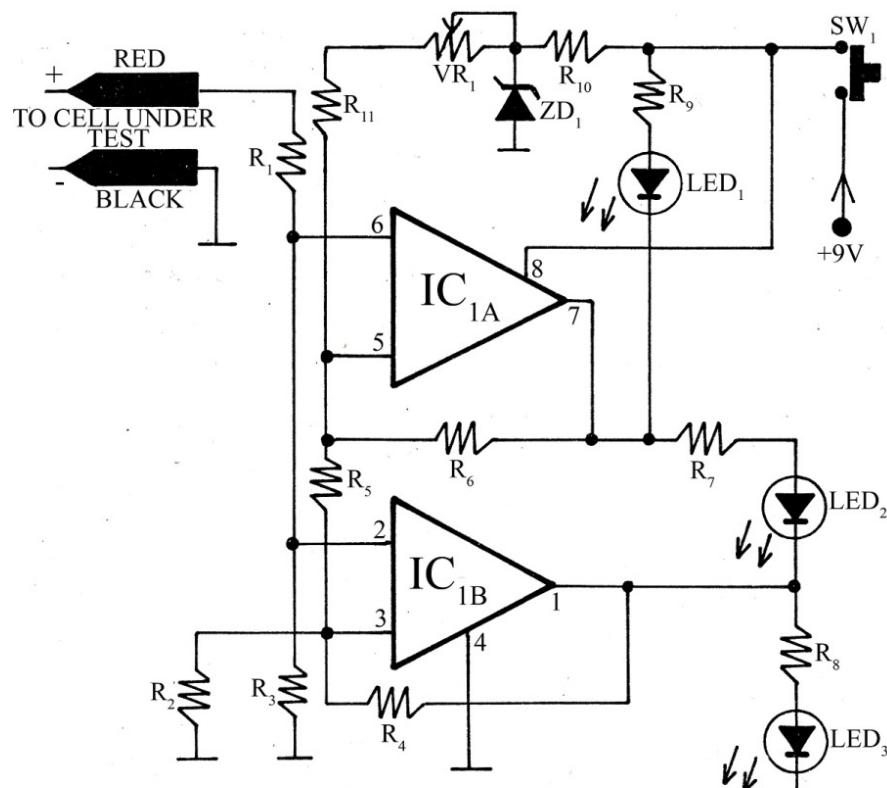


Figure 1: Circuit Diagram of Universal Battery Tester

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

$R_1, R_3 = 5.6 \Omega$; $R_2 = 3.3 \text{ k}\Omega$; $R_4, R_6 = 1 \text{ M}\Omega$; $R_5, R_7, R_9 = 1 \text{ k}\Omega$; $R_8, R_{10} = 820 \Omega$; $R_{11} = 10 \text{ k}\Omega$

Semiconductors

$\text{IC}_1 = \text{TL072CD}$; $\text{ZD}_1 = 3.3 \text{ V}/500\text{mW}$

$\text{LED}_1 = \text{RED LED}$

$\text{LED}_2 = \text{GREEN LED}$

$\text{LED}_3 = \text{YELLOW LED}$

Miscellaneous

$\text{SW}_1 = \text{Push to on switch}$

Two probe

265. Traffic Light Controller

The circuit given here is substitute of old mechanical traffic-light controllers which are not reliable. The circuit's timing and sequential operation are done by two CMOS ICs (IC_1 and IC_2) while the actual power switching is done by triacs.

A 10V negative power supply is obtained directly from the mains my means of D_1 , R_1 , D_2 , and C_1 . Gates N_1 through N_6 constitute IC_2 while IC_1 is a Johnson counter. $N_1 - N_3$ are wired as an astable multivibrator whose time period can be adjusted between 1 second and 10 seconds with VR_1 . The decade outputs of IC_1 are wired such that when Q_0 and Q_5 is high, the output of N_5 goes low. Similarly, the outputs of N_4 and N_6 become low when Q_1 to Q_4 and Q_6 to Q_9 become low respectively. Since we have negative supply, a low output of any of the gates N_4 to N_6 cause the respective triac to fire.

Thus, the ratios of the time periods for the lamps in the sequence O:G:O:R are 1:4:1:4.

Resistor R_{10} to R_{12} and capacitor C_4 and C_6 are absolutely necessary, these avoid spurious triggering of the triacs which may hamper traffic flow.

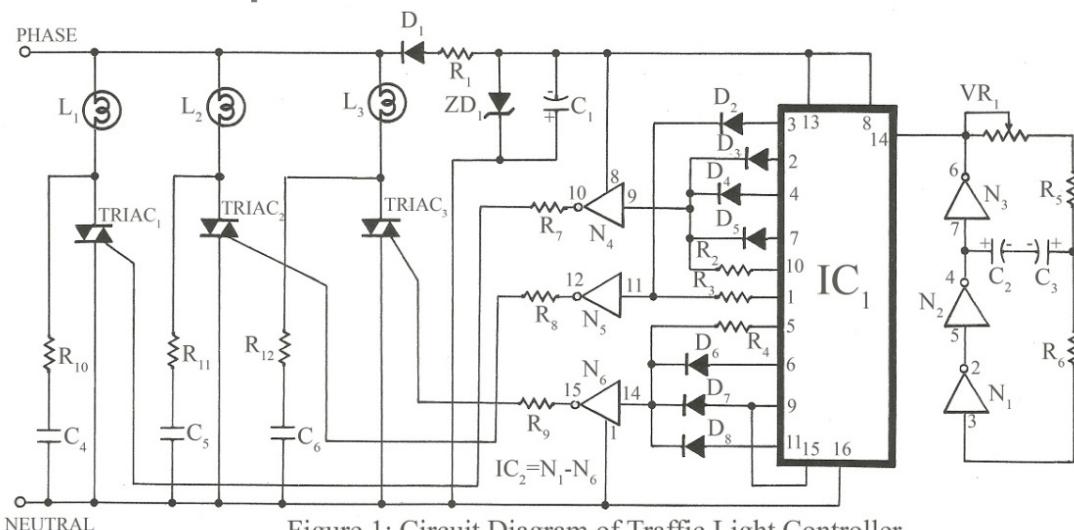


Figure 1: Circuit Diagram of Traffic Light Controller

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

R1 = 5 K Ω /5W; R2, R3, R4 = 22 K Ω ; R5 = 100 K Ω ; R6 = 1 M Ω ; R7, R8, R9 = 1 K Ω ; R10, R11, R12 = 100 Ω /1W; VR1 = 1 M Ω

Capacitors

C1 = 1000 μ F/16V; C2, C3 = 22 μ F/16V; C4, C5, C6 = 0.01 μ F/400V

Semiconductors

IC1 = CD4017; IC2(N1 – N6) = CD4049; D1 = BY127

266. Simple Pulse Generator

This circuit is used to provide positive going pulses. The pulse width varies from 10 μ s to 100 ms at the rate of 20 pulses per second to 1 pulse per second and adjusted by a 1 M Ω potentiometer. Transistor T1 and T2 form a relaxation oscillatory circuitry. The frequency of oscillation depends on C1 and VR1. The pulse width is varied by a 47K Ω (VR2) potentiometer. Any required pulse width range is selected by the switch SW1 below

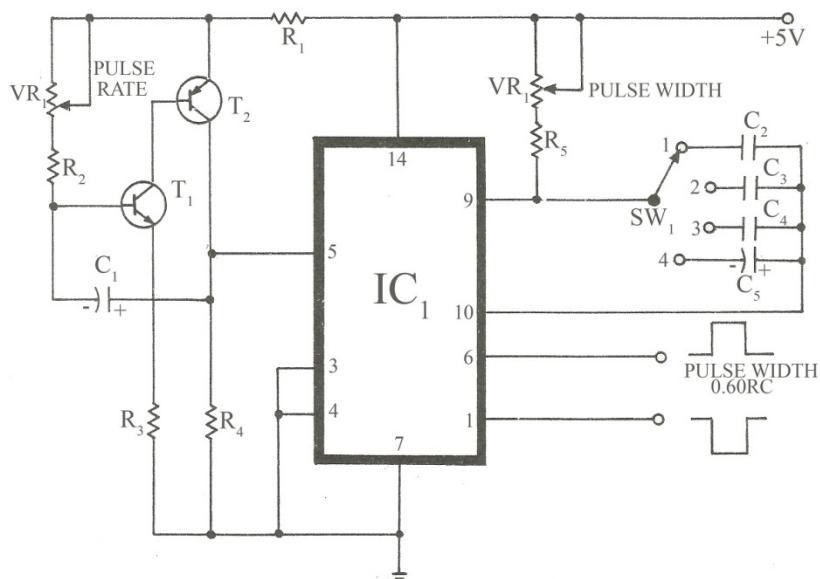


Figure 1: Circuit Diagram of Pulse Generator

Position of switch SW1 Pulse width

1 10 μ s to 100 μ s

2 100 μ s to 1 ms

3 1 ms to 10 ms

4 10ms to 100 ms

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

R1 = 33 Ω ; R2 = 47 K Ω ; R3 = 47 Ω ; R4 = 33 Ω ; R5 = 2.7 K Ω ; R1 = 1 M Ω LOG; VR2 = 47 K Ω

LIN POT.

Capacitors

C1 = 1 μ F/16V; C2 = 0.0022 μ F; C3 = 0.022 μ F; C4 = 0.22 μ F; C5 = 2.2 μ F/16v

Semiconductors

T1 = SL100; T2 = SK100; IC1 = 74121

Miscellaneous

SW1 = 1 pole 4

267. Simple low/high voltage cut circuit

Now, here is very simple low/high voltage cut circuit using only two transistors.

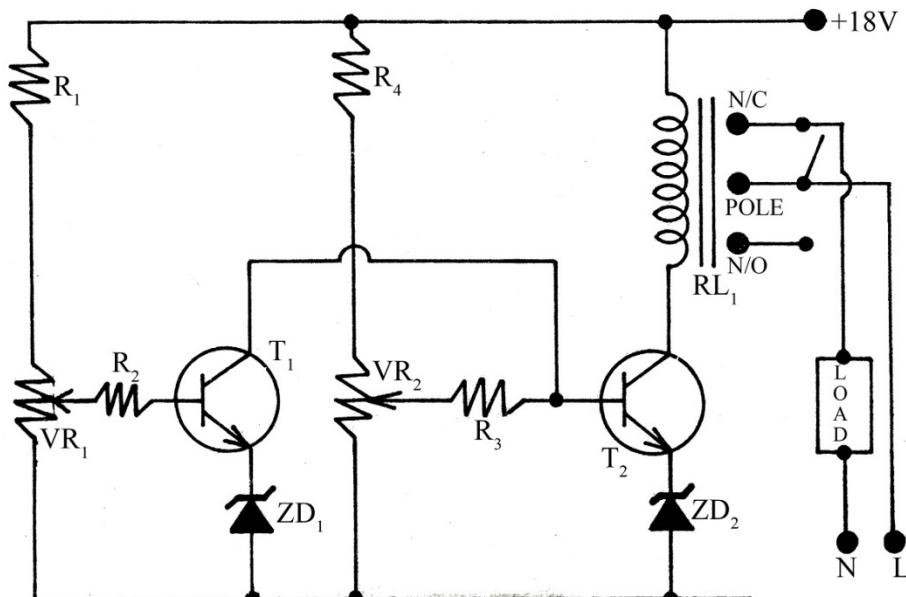


Figure 1: Circuit Diagram of Super Simple High Low Voltage Cut

Circuit Description:

The entire circuit is built using only two transistors and very few other components. The two transistors are used to drive a relay. Transistor T1 and T2 cut the supply in high and low voltage respectively. Variable resistor VR1 and VR2 is used to adjust the high and low voltage. As we know that when zener diode is connected to emitter of transistor then it gets back bias voltage. The variable resistor VR1 and VR2 is so adjusted that it does not connect the transistor T2 and T1 in high and low voltage respectively. The load is connected through relay RL1.

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

R1, R4 = 4.7 K Ω ; R2, R3 = 220 Ω ; VR1 = 10 K Ω ; VR2 = 10 K Ω

Semiconductors

T1, T2 = BC148; ZD1, ZD2 = 5.6V

Miscellaneous

RL1 = 18V/500 Ω

268. Simple Frequency Meter

Here is a simple frequency meter with which input frequency can be determined by simply measuring the values of two resistors and a little bit of computation.

A retriggerable monostable multivibrator and a D flip-flop can form a simple, yet reliable frequency comparator that compares an input frequency with a predetermined reference. To determine whether an input frequency (f) falls between two known frequencies, f_1 and f_2 , two one-shot/flip-flop combinations are used, as shown.

Here both the one-shot and the flip-flop ICs are wired for positive-edge triggering. Each input pulse causes the monostable's output to go high for the period of its preset timing interval. The flip-flop is triggered simultaneously, but its output is determined by the state of its D input at the time of trigger threshold.

If the period of the input frequency is shorter than the preset timing of the monostable, a constant high level will be present at the D input, forcing the flip-flop's Q output to remain high. If the input frequency period becomes greater than that of the monostable, the flip-flop's Q output will go low.

VR_1 , VR_2 , and C_1 , C_2 determine the value of the time period of f_1 and f_2 . Some typical values for measuring a range of input frequencies is given in Table 1.

One way to measure the frequency is to increase f_2 by decreasing the value of R_2 until LED3 goes 'off' and LED4 goes 'on'. Then R_1 is decrease so that LED1 goes 'on' and LED2 goes 'off'. Now both LED1 and LED4 glow and the value of R_1 and R_2 are measured. Frequencies f_1 and f_2 are calculated by the formulae

$$f_1 = 1/(1.1R_1C_1) \text{ and } f_2 = 1/(1.1R_2C_2)$$

and the input frequency ' f ' falls in between f_1 and f_2 . If

$$f_1 < f$$

$$f_2 < f$$

It can be further noted that the values of the resistors and the capacitors can be taken according to one's application.

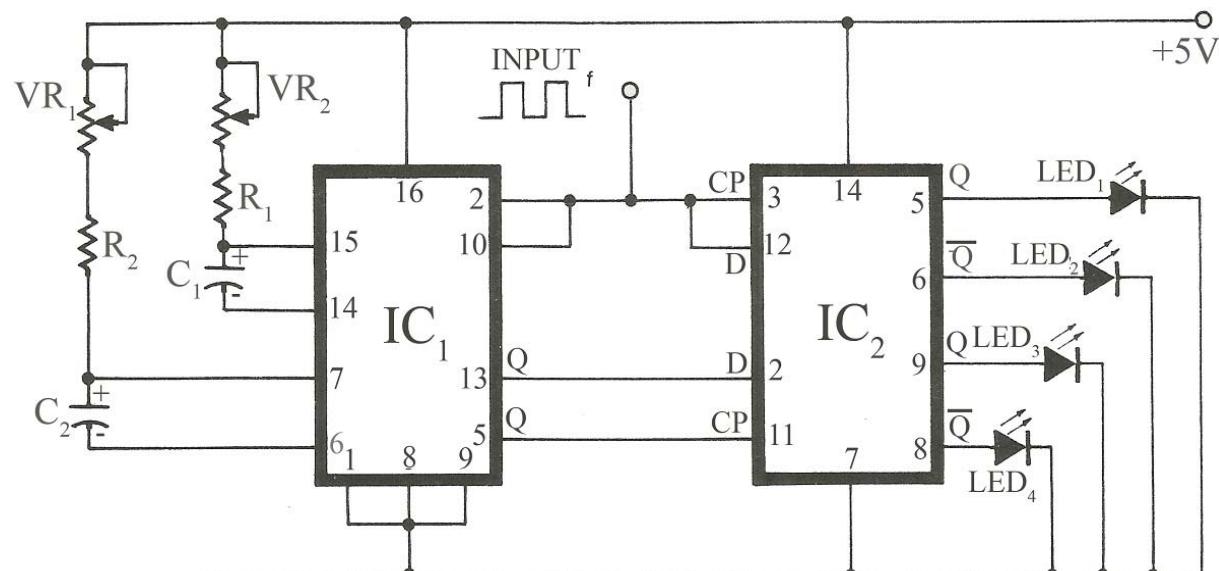


Figure 1: Circuit Diagram of Simple Frequency Meter

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

$R_1, R_2 = 10 \Omega$; $VR_1, VR_2 = 4.7 K\Omega$

Capacitors

$C_1, C_2 = 10 \mu F/10V$

Semiconductors

$IC_1 = 74123, IC_2 = 7474$

$LED_1 - LED_4 = \text{different color LED}$

269. Musical AF/IF checker

There are several signal generator circuit proposed by many engineers but few are reliable over a range. Most of the circuits are designed for a fixed or constant frequency range. This circuit produces music instead of 10 KHz oscillation. Music notes are modulated to 455 KHz. The modulated signal is used for checking and alignment of IFTs at the time of servicing of audio equipment.

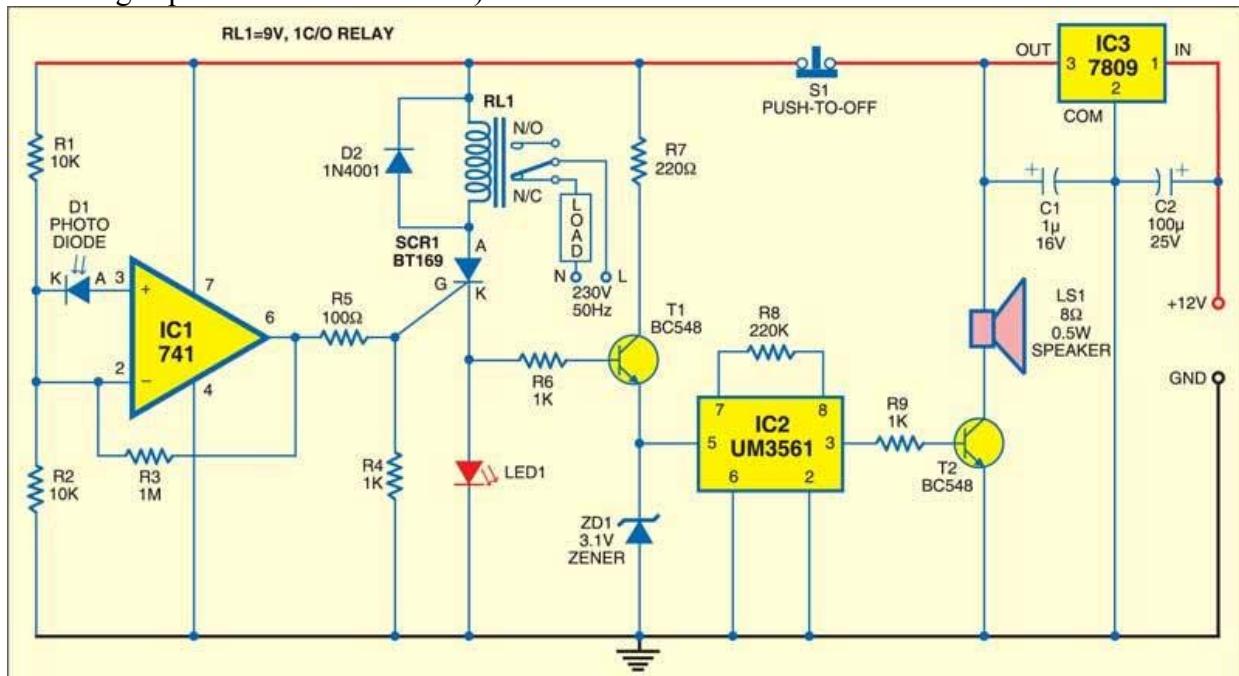
The main parts of the circuit are audio tone generator, RF oscillator and modulator. For audio tone generator the musical IC UM66 (IC1) used. This IC has 64-note ROM memory.

The oscillator section consists of low-noise crystal oscillator. The crystal of 455 KHz used for frequency control. There is no frequency drift in the circuit as no tuned circuit is being used.

Therefore, the IFTs can be aligned correctly.

The output section of the circuit is modulator which modulates the AF and RF signals. The modulated signal is taped from the output jack. The whole setup is enclosed in a small metal box. The output jack and switch SW1 are fitted on the front panel of the box.

When switch SW1 is in position A, we can get the modulated IF signal from the jack. When the switch is in position B, we get AF signal from the jack. For alignment of 2-band radio we can replace the crystal with another crystal producing frequencies of 550 KHz, 1600 KHz, 600 KHz, 5MHz or 16 MHz and replace the IFT with a small ferrite core transformer (or an IFT without the tuning capacitor can also be used).



PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

$R_1 = 270 \Omega$; $R_2 = 220 \Omega$; $R_3, R_7 = 10 \text{ k}\Omega$; $R_4 = 470 \text{ k}\Omega$; $R_5 = 4.7 \text{ k}\Omega$; $R_6 = 1.2 \text{ k}\Omega$; $R_8 = 220 \text{ k}\Omega$; $R_9 = 1 \text{ k}\Omega$

Capacitors

$C_1 = 1 \mu\text{F}/16\text{V}$; $C_2, C_4 = 0.1 \mu\text{F}$; $C_4 = 390 \text{ pF}$; $C_5 = 0.04 \mu\text{F}$; $C_6 = 0.01 \mu\text{F}$; $C_7 = 100 \mu\text{F}/16\text{V}$

Semiconductor

$\text{IC}_1 = \text{UM66}$; $\text{T}_1, \text{T}_2 = \text{BF494B}$; $\text{D}_1 = \text{1N4148}$; $\text{ZD}_1 = 3\text{V } 400\text{mW}$

Miscellaneous

$\text{XTAL}_1 = 455 \text{ KHz}$

$\text{SW}_1 = 1\text{-pole two way switch}$

IFT

Read more <http://electronicsproject.org/musical-afif-checker/>

270. Mini amplifier

Here is a simple project , mini amplifier built around LM1895 followed by passive components. The output of 10mW to 1W is obtained so, the circuit is called mini amplifier.

Circuit Description

The output from mike or pre-amplifier is fed to pin no.4 through variable resistor VR1 and capacitor C4. Variable resistor VR1 is used to select the intensity of signal. Capacitor C2 and C6 is used to filter and develop the supply, where capacitor C3 and C5 is used to bias the audio frequency. The output of amplifier IC is obtained at pin 1 where resistor R4 and capacitor C8 is used as feedback component. The output is given to loudspeaker through capacitor C7 in order to produce sound.

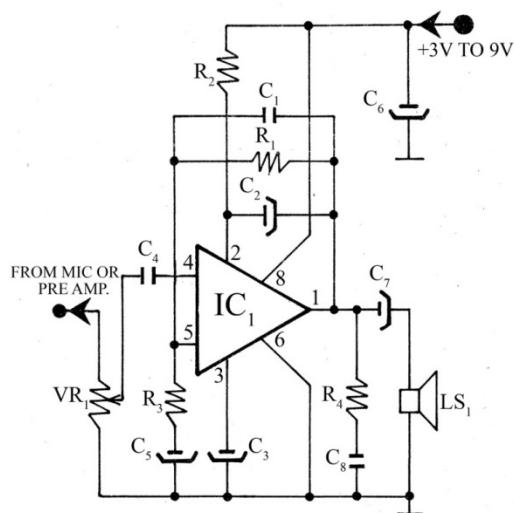


Figure 1: Circuit Diagram of Mini Amplifier

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

$R_1 = 10 \text{ k}\Omega$; $R_2 = 47\Omega$; $R_3 = 220\Omega$; $R_4 = 1\Omega$; $VR_1 = 50 \text{ k}\Omega$

Capacitors

$C_1 = 470 \text{ pF}$; $C_2 = 220 \mu\text{F}/10\text{V}$; $C_3 = 100 \mu\text{F}/10\text{V}$; $C_4 = 0.1 \mu\text{F}$; $C_5 = 10 \mu\text{F}/10\text{V}$; $C_6, C_7 = 470 \mu\text{F}/10\text{V}$; $C_8 = 0.1 \mu\text{F}$

Semiconductors

IC1 = LM1895N

Miscellaneous

LS1 = $4\Omega/1\text{W}$ speaker

271. Flashing Light with twilight switch

Flashing light is very useful in order to indicate any obstruction or working in progress. The project automatic flashing light with twilight switch flash light in dark but during day it automatically turns off itself.

Circuit Description

The circuit diagram of automatic flashing light with twilight switch is shown below where LDR is used as sensor. In the presence of light LDR offer low resistance and in dark it offers high resistance. When there is absence light, LDR offer high resistances which turn off the transistor T1. Due to this darlington pair made from transistor T2 and T3 is turn on which further glow bulb. The feedback from its output is given to the junction of resistor R2 and LDR as shown in circuit diagram. Due to feedback this circuit works as oscillator which work as flasher. Variable resistor VR1 is used to adjust the sensitivity of LDR.

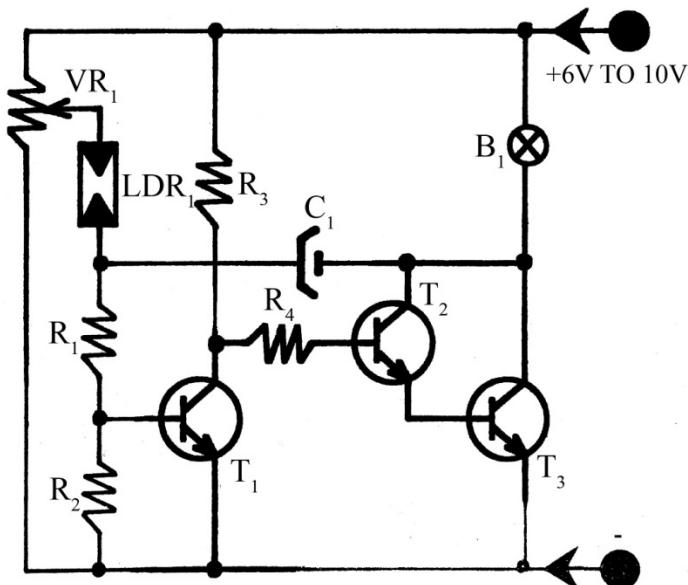


Figure 1 : Circuit Diagram of Flashing Light With Twilight Switch

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon unless stated otherwise)

$R_1 = 2.2 \text{ K}\Omega$; $R_2, R_3 = 1 \text{ K}\Omega$; $R_4 = 3.3 \text{ K}\Omega$; $VR_1 = 25 \text{ K}\Omega$

Capacitors

$C_1 = 1 \mu\text{F} - 10 \mu\text{F}$

Semiconductors

$T_1, T_2 = \text{BC547B}$; $T_3 = \text{BEL187-P}$

Miscellaneous LDR, $B_1 = 3\text{V}$ to 10V bulb

272. Low-cost Touch Sensitive Switch

While experiment with a high gain transistor it may be noticed the transistor gets saturated by just touching its base. Here is a single, low-cost touch switch based on this idea. The 50Hz hum present in our body is the key of this circuit.

BEL BC557B pnp transistor has been chosen for this circuit. All the transistors used in this circuit are of pnp type. The circuit is basically a RS flip-flop formed by T3 and T4. Set and reset inputs are buffered by T1 and T2. Set and Reset inputs are buffered by T1 and T2. On switching the power supply on the bases of T3 and T4 become positive simultaneously. But due to slight difference in characteristics of T3 and T4 (since it is not possible to make perfectly matched transistor) one of the transistor become unsaturated. Transistor T5 is used as relay driver transistor.

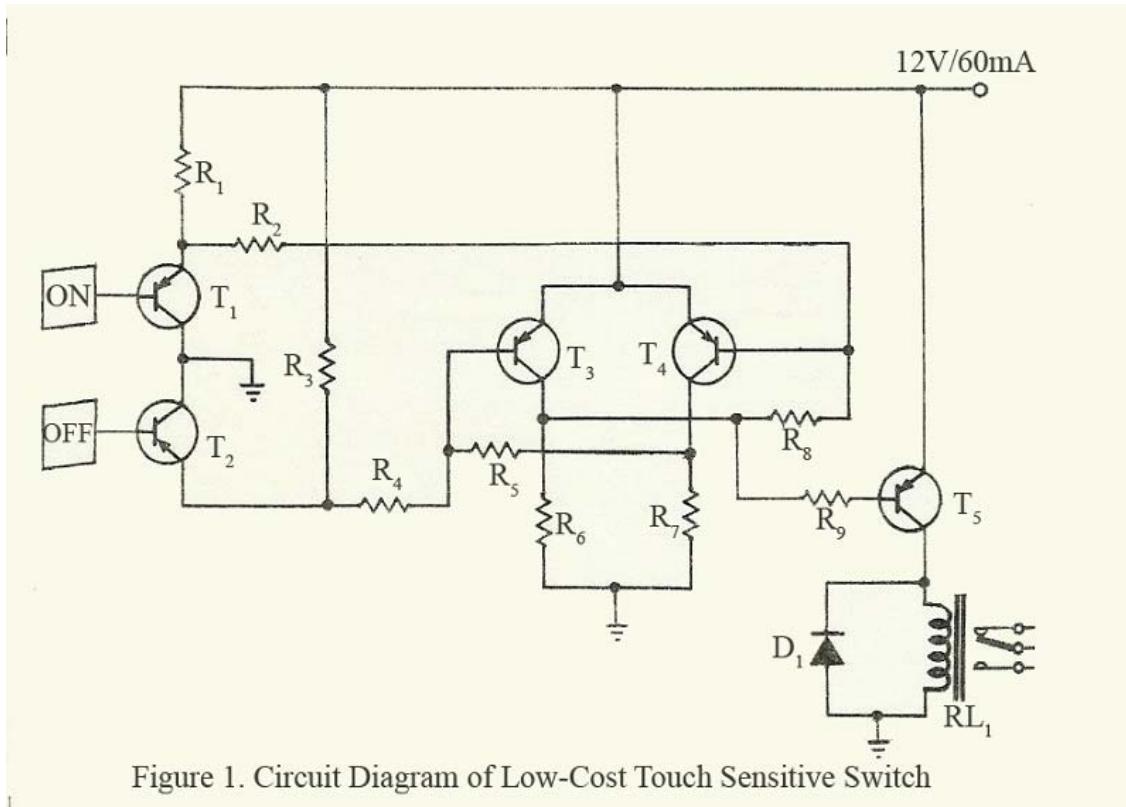


Figure 1. Circuit Diagram of Low-Cost Touch Sensitive Switch

PARTS LIST

Resistors (all 1/4-watt, ± 5% Carbon)

$$R_1, R_3, R_6, R_7, R_9 = 10 \text{ k}\Omega$$

R2 R4 R5 R8 = 220 K Ω

II, III, IV, V Semiconductors

Semiconductors
T1 = T5 ≡ BC557B

D1 ≡ 1N4001

DI – TN400
Miscellaneo

273. Multi-way Switch

With this circuit you can control any of your electrical appliances from any point with only two wires extending from the circuit to those points. One need not, for instance, keep the passage lights on always since the accessibility of the switch can be provided to every require point. It can thus be used in energy saving device in long passages.

In this circuit, switches SW₁, SW₂, SW₃...SW_n are connected between the clock pin of IC CD4042A and the power supply. The Q output pin 3 of the FF is feedback to its D input pin 4. The output from pin 2 is connected to the base of darlington pair amplifier formed by BC107 and SL100, which drives the relay. The connection to the appliance can be through the N/O contact of the relay. The circuit is powered by 12V DC. The impedance of the relay used should be greater than 100-ohm.

With this circuit you can easily make a three way switch or switch with unlimited numbers of terminals where each can individually control the output.

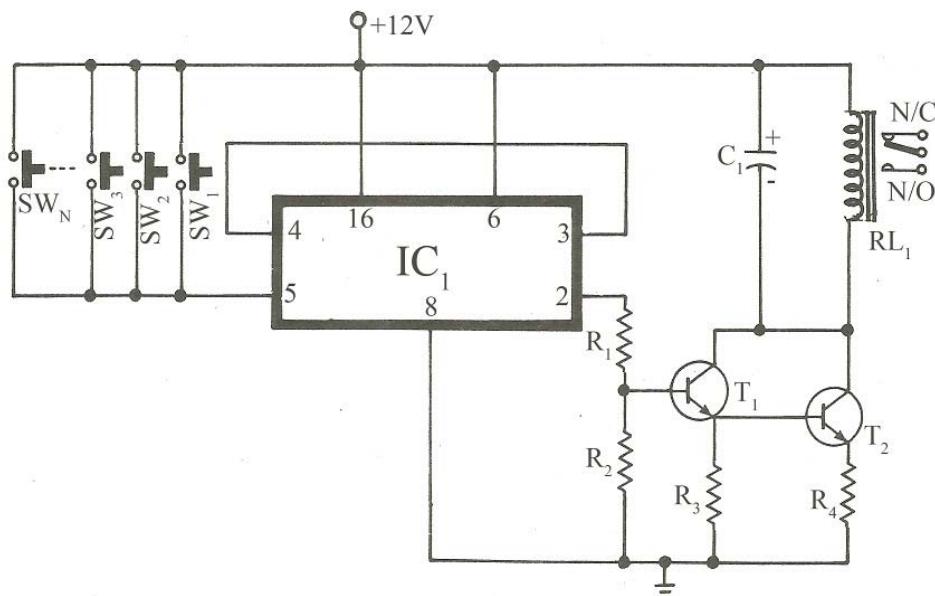


Figure 1: Circuit Diagram of Multy-Way Switch

There is no need to connect a debouncing circuit between the switches and the IC.

PARTS LIST

Resistors (all 1/4-watt, $\pm 5\%$ Carbon)

R₁ = 10 K Ω ; R₂ = 3.3 K Ω ; R₃ = 1 K Ω ; R₄ = 10 Ω

Capacitor

C₁ = 50 μ F/25V

Semiconductors

IC₁ = CD4042A; T₁ = BC107; T₂ = SL100

Miscellaneous

SW₁ – SW_n = Push to on switch; RL₁ = 12V, >100 Ω relay

274. AC mains voltage indicator

Here is simple and very useful circuit AC mains voltage indicator, indicates the voltage level of AC mains by three different LEDs. AC mains voltage indicator circuit can be made and assemble even by beginners.

Circuit description of AC mains voltage indicator

All three LEDs of AC mains voltage indicator are connected between collectors of transistors T1, T2, T3 respectively. Here potentiometer VR1, VR2, and VR3 are used to adjust the base voltage of transistor T1, T2 and T3 respectively. As shown in circuit diagram first AC mains is stepped down by 9V-0-9V transformer and then rectified by a signal diode D1 and smoothed by C1 which give output 25V DC. This circuit is work on the principle, when AC mains vary DC voltage also varies proportionally and sensed by transistor T1 through T3.

For setting the low level voltage, a manual AC voltage regulator (MVR) should be connected to the primary of transformer X1. Now set AC voltage of MVR to about 175V and slowly potentiometer VR1 adjusted until voltage across the base of transistor T1 reaches 9.7V and transistor starts conducting which glow LED1 and stop glowing when the base voltage drops below the preset value. This process is repeated for 200V and 230V in which LED2 and LED3 glows respectively.

Now connect this circuit to AC mains, if the voltage drop below 175 volts no LEDs glow. First, a high voltage (more than 230V) is indicated by all three LEDs glows (LED1, LED2, LED3). Second, normally voltage (200V-230V) is indicated by two LEDs (LED1 and LED2). Third, a low voltage (175V-200V) is indicated by the glowing of LED1 only.

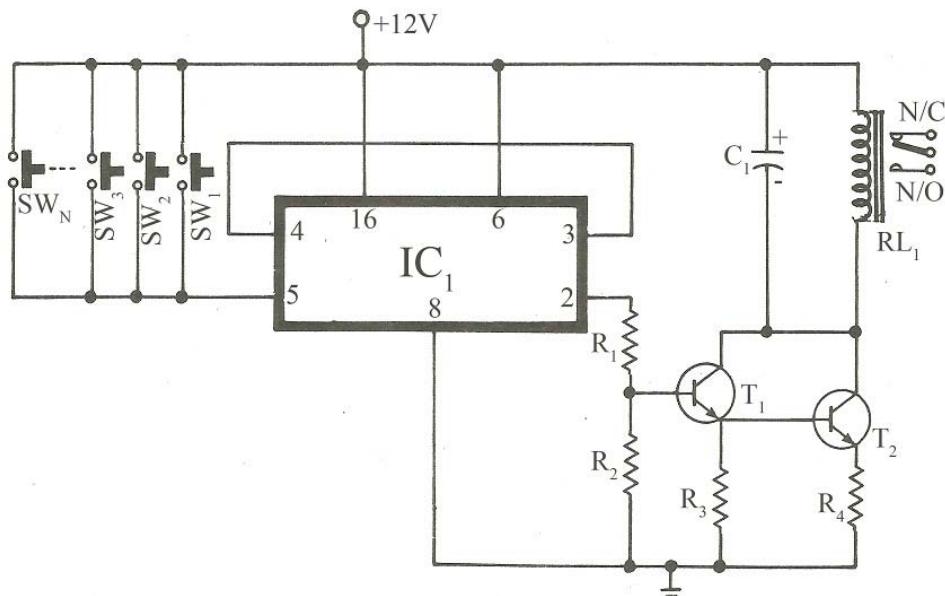


Figure 1: Circuit Diagram of Multy-Way Switch

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1- R6= 1 K Ω

VR1 – VR3 = 10 K Ω

Capacitor

C1 = 220 μ F/50V

Semiconductors
T1 – T3 = BC547
ZD1 – ZD3 = 9.1V zener diode
D1 = 1N4001
LED1 – LED3 = Simple LED
Miscellaneous
X1 = 230V AC primary to 9V-0-9V, 250mA secondary transformer
SW1 = On/off switch

275. Bridge Power Audio Amplifier

Here is simple circuit of bridge power audio amplifier used in application requiring more power than is provided by the single LM380 amplifier, the two LM380s can be used in the bridge configuration shown in figure 1. In this arrangement (bridge power audio amplifier) the maximum output voltage swing will be twice that of a single LM380 amplifier; therefore, the power delivered to the load by bridge power audio amplifier will be four times as much. For improved performance, potentiometer R3 should be used to balance the output offset voltage of the LM380s. Here R2 C3 for stability with high-current loads.

PARTS LISTS

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)
R1 = 2 M Ω potentiometer; R2 = 2.7 Ω ; R3 = 1 M Ω
Capacitors
C1, C2, C3 = 0.1 μ F; C4 = 51 pF
Semiconductors
IC1, IC2 = LM380 audio power amplifier
Miscellaneous
8 Ω 1-W speaker

276. Automatic Temperature Controlled Fan

Circuit description

The circuit of automatic temperature controlled fan is build around temperature transducer AD590 followed by operational amplifier LM324. AD590 is a temperature transducer, change temperature into corresponding voltage. The output of transducer is given to pin 2 of IC2 LM324. The two reference voltage is given to pin 6 and pin 10 through variable resistor VR1 and VR2 respectively. The value of these variable resistor is fixed according to operating temperature (i.e. RL1 energized when temperature is above 300C and RL2 energized when temperature is below 230C). The output is taken from pin 7 and pin 8 which further given to base of transistor T1 and T2 through resistor R5 and R6 respectively. Transistor T1 and T2 is used as relay driver transistor. The two input is given from two different stage of regulator.

Power supply Circuit:- The primary AC voltage is step down to 12 – 0 – 12 by using transformer X1 which further rectified using bridge rectifier (D1 through D4). The rectified output is filtered using capacitor and given to input pin 1 of voltage regulator IC 7812 (IC1). The regulated output is taken from pin 3 of IC1 where pin 2 is grounded.

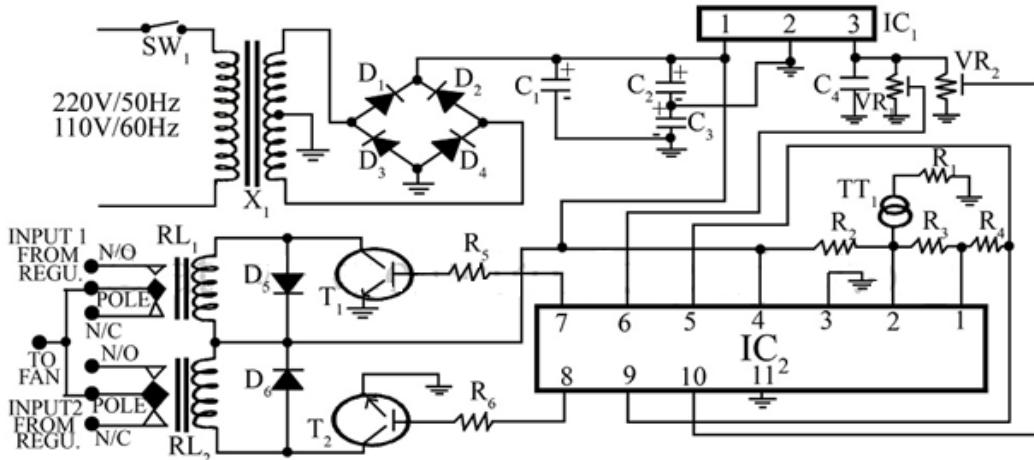


Figure : Circuit Diagram of Automatic Temperature Controlled Fan

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R₁ = 100 K Ω ; R₂ = 56 K Ω ; R₃ = 39 K Ω ; R₄, R₅, R₆ = 1 K Ω ; VR₁, VR₂ = 10 K Ω (Preset)

Capacitors

C₁ = 1000 μ F/40V; C₂, C₃ = 1000 μ F/25V; C₄ = 0.1 μ F

Semiconductors

IC₁ = LM7812 (12V regulator IC)

IC₂ = LM324 (operational amplifier)

T₁, T₂ = SL100

D₁ – D₆ = 1N4001 (rectifier diode)

Miscellaneous

TT₁ = AD590 (temperature transducer)

RL₁, RL₂ = 12V 200 Ω

277. Car Reverse Horn

Here is a simple project “Car Reverse Horn”, can be used in car as reverse horn i.e. produce sound when car is moving in reverse direction.

Circuit description

The heart of car reverse horn circuit is melody generator IC CIC2877 (IC1) followed by amplifier IC and few passive components. IC1 is made from a ROM oscillator and a pre-amplifier which further generate sound. The generated sound output is available at pin 3 which is further connected to pin 2 of amplifier IC through variable resistor VR1. IC2 amplify the generated sound up to desired level and its output from pin 7 and 12 is given to loudspeaker through coupling capacitors C8 and C9 respectively. The power supply is given to the circuit from battery of car.

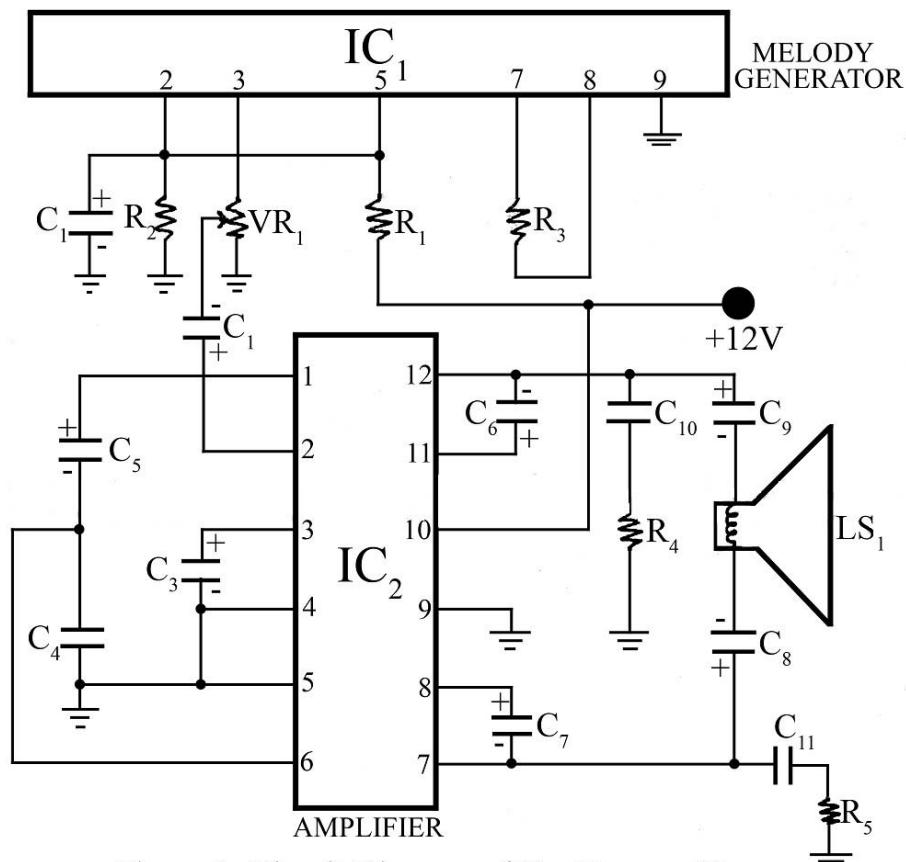


Figure 1: Circuit Diagram of Car Reverse Horn

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R₁ = 1.5 K Ω , R₂ = 1 K Ω , R₃ = 120 K Ω , R₄, R₅ = 1 Ω

Capacitors

C₁ = 10 μ F/25V (electrolytic)

278. Direction Indicator

Direction indicator is very interesting as well as very useful project in any ceremony, party etc. to indicate places like bathroom. The alternate glowing LEDs in direction indicator make this project more attractive.

Circuit description of direction indicator

The logic of direction indicator is very simple and is designed and fabricated around CMOS HEX inverter buffer CD4049 containing six independent inverter (a-f). For effective use of this project all LED must be of RED color.

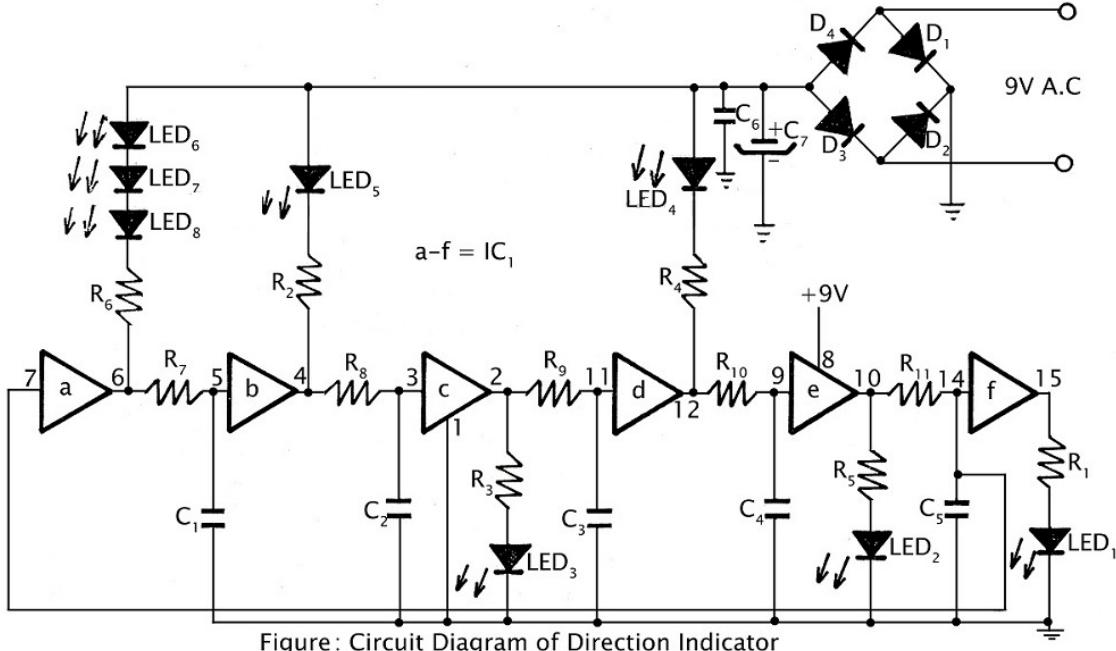


Figure: Circuit Diagram of Direction Indicator

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1 – R5 = $470\ \Omega$; R6 = $330\ \Omega$; R7 – R11 = $1\ M\Omega$

Capacitors

C1 – C6 = 100 KPF; C7 = $470\ \mu F/16V$

Semiconductors

IC1 = CD4049; D1 – D4 1N4007

Miscellaneous

LED1 – LED8 = RED color

279. Electronics Motor Controller

Here is a circuit used to control motor more efficiently than any electromechanically controlling device. The project shown here is cheap and easy to construct. It also overcome the problem of noise triggering and noise pulse.

Circuit description

The power supply is given by pressing switch SW1 it shots the N/O contact of relay RL-1 which gives supply to the circuit. The current through resistor R8 gives the base current to transistor T5. Where transistor T1, T2 and T3 from the over and under-voltage cut-offs. Here the transistor T4 on when over or under voltage is given to transistor T3.

For avoiding noise capacitor C2 with resistor R10 form a loss-pass filter and also give sufficient time delay. Here the resistor network (R11, R12, VR1) are used as current sensor. Where Diode D3 is as rectifier and capacitor C1 is used as noise filter of switching circuit.

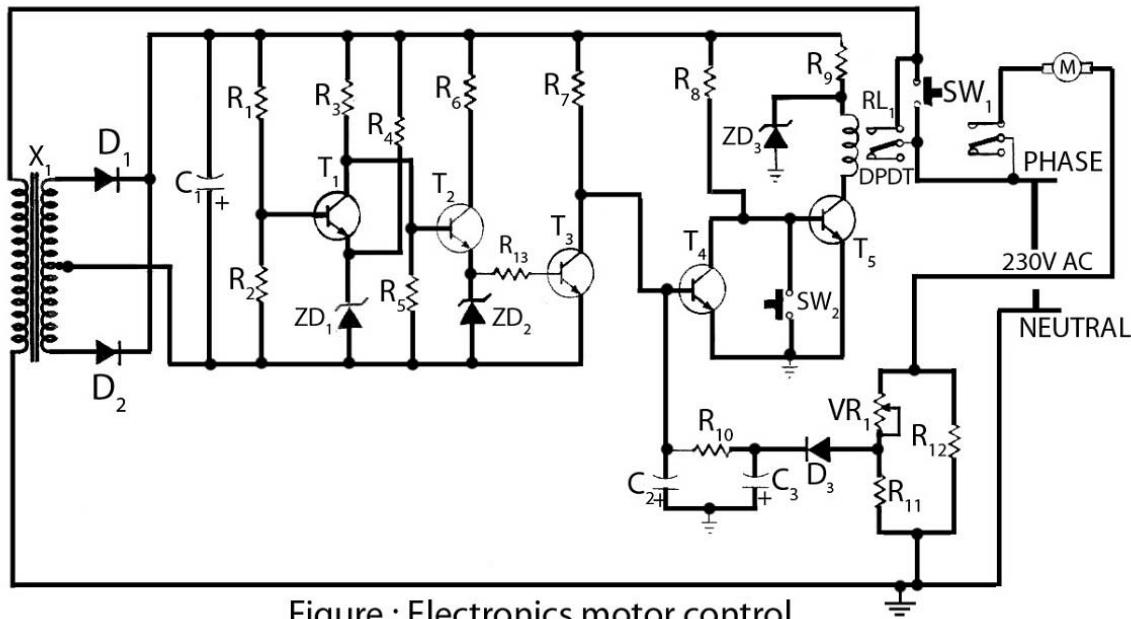


Figure : Electronics motor control

PARTS LIST

Resistors (all 1/4-watt, ± 5% Carbon)

R1 = 150 K Ω ; R2 = 33 K Ω ; R3 = 6.7 K Ω ; R4 = 100 K Ω ; R5 = 39 K Ω ; R6 = 15 K Ω ; R7 = 10 K Ω ; R8 = 4.7 K Ω ; R9 = 75 Ω /1W; R10, R13 = 47 K Ω ; R11 = 470 Ω ; R12 = 0.5 Ω ; VR1 = 2.2 K Ω

Capacitors

C1 = 1000 μ F/25V; C2, C3 = 47 μ F/10V

Semiconductors

T1, T2, T3, T4 = BC148; T5 = SL100; D1, D2, D3 = 1N4001; ZD1, ZD2 = 3.1V; ZD3 = 9.1V

Miscellaneous

SW1, SW2 = Push to on switch

X1 = 230 primary AC primary to 18-0-18, 500mA secondary transformer

OR

(110 primary AC primary to 18-0-18, 500mA secondary transformer)

RL1 = 12V, 200 Ω Double pole double throw

M = Motor

280. Electronics Thermometer

Clinical thermometer is only used by doctor because it is difficult to read. Here is a circuit of electronics thermometer used to measure vast range of temperature from -200C to 1250C. This single circuit electronics thermometer can be used to measure different temperature. The wide range of temperature measurement made this circuit versatile.

Circuit Description of electronics thermometer

This entire circuit “Electronics thermometer” is built and fabricated around silicon diode D1 (1N4148) and Operational amplifier IC. Diode D1 is used as temperature sensor, temperature determined the value of voltmeter drop across diode i.e. at room temperature voltage drop is 0.7V and is reduce by about 2mV/0C.

For temperature-to-voltage conversion in electronics thermometer an operational amplifier is used. The input voltage at non-inverting pin 3 of IC1 is fixed by VR1, R1, & R2 where sensor diode D1 forms a feedback path. The output of IC1 is directly depends on the voltage across the diode.

Operational amplifier IC1 is used as voltage amplifier which amplifies the output from IC1. Finally, ammeter is used to indicate the temperature.

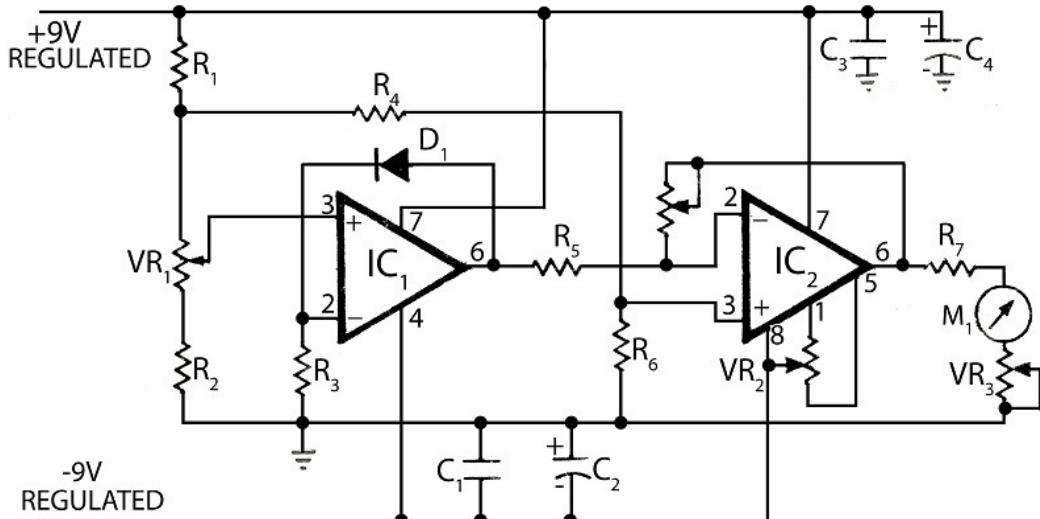


Figure 1: Circuit Diagram of Electronics Thermometer

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

$R_1 = 680 \Omega$; $R_2 = 1 \text{ k}\Omega$; $R_3, R_4, R_5 = 1 \text{ k}\Omega$; $R_6 = 6.8 \text{ k}\Omega$; $R_7 = 10 \text{ k}\Omega$; $VR_1 = 2.2 \text{ k}\Omega$

$VR_2, VR_3, VR_5 = 10 \text{ k}\Omega$

Capacitors

$C_1, C_3 = 0.1 \mu\text{F}$; $C_2 = 10 \mu\text{F}/16\text{V}$; $C_4 = 10 \mu\text{F}/16\text{V}$

Semiconductors

$IC_1, IC_2 = \mu\text{A}741$; $D_1 = 1N4148$ (Sensor)

Miscellaneous

$M_1 = 1\text{mA}-0-1\text{mA}$ or $0-1\text{mA}$ Ammeter

281. Fridge Alert System

Here is a simple circuit “Fridge Alert System” can be used in fridge, indicating whether the temperature is more than pre-defined temperature. The arrangement of the circuit fridge alert system showed here alert when temperature increased then 50C.

Thermistor TH1 is used as temperature sensor, change their resistance whenever changes in surrounding temperature. IC1 CL7611 combined with thermistor to complete all the process of temperature. IC2 is used here to indicate the status of battery. Glowing LED1 indicate temperature is more than 50C.

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

$R_1, R_2 = 4.7 \text{ M}\Omega$; $R_3 = 2.2 \text{ M}\Omega$; $R_4 = 56 \text{ k}\Omega$; $R_5 = 12 \text{ k}\Omega$; $R_6 = 10 \text{ k}\Omega$; $R_7 = 270 \Omega$; $R_8 = 390 \Omega$

Semiconductors

IC1 = CL7611; IC2 = 8211; T1 = 2TX300; LED1 = RED; LED2 = Green
 Miscellaneous
 SW1 = Push-to-on switch; TH1 = GL16 thermistor

282. Light sensitive switch

Light sensitive switch is a special type of switch which properties depends upon the light falling in it. Here is a simple, inexpensive and easy to use light sensitive switch. The working of this circuit is truly based on light sensing, i.e. automatic turn it on or off when light fall on it.

Circuit Description

As this is a switching circuit so, for more detail we can divide this circuit into two section i.e. power supply and switching circuit.

In this power supply section the work of step-down transformer is done by register R1 and further rectification to change into 10V dc is by zener diode ZD1. The output voltage across zener diode is further filtered by capacitor C1.

Another section is switching section built around light-dependent register LDR1 with the help of operational amplifier IC 741, where LDR is used as sensor of the switching circuit. By changing the position of switch we can make this circuit both light sensitive and dark sensitive (i.e. turn on in light and turn in dark respectively). LDR sense the light and change their resistance corresponding to light and given to pin 2 which is further adjusted by preset VR1. Output is obtained from pin 6 of IC1 and given to base of transistor T1 through resistor R6 where resistor R7 is used as current limiter. The output is from collector of transistor T1 is given to gate of TRIAC1 which further turn on the light.

As light Sensor

By connecting point 1 and 2 of switch SW2 and point 2 and 3 of switch SW1 then the circuit is work as light sensor (i.e. turn on the bulb when light fall on it).

As dark Sensor

By connecting point 2 and 3 of switch SW2 and point 1 and 2 of switch SW1 then the circuit is work as dark sensor (i.e. turn on the bulb in absence of light).

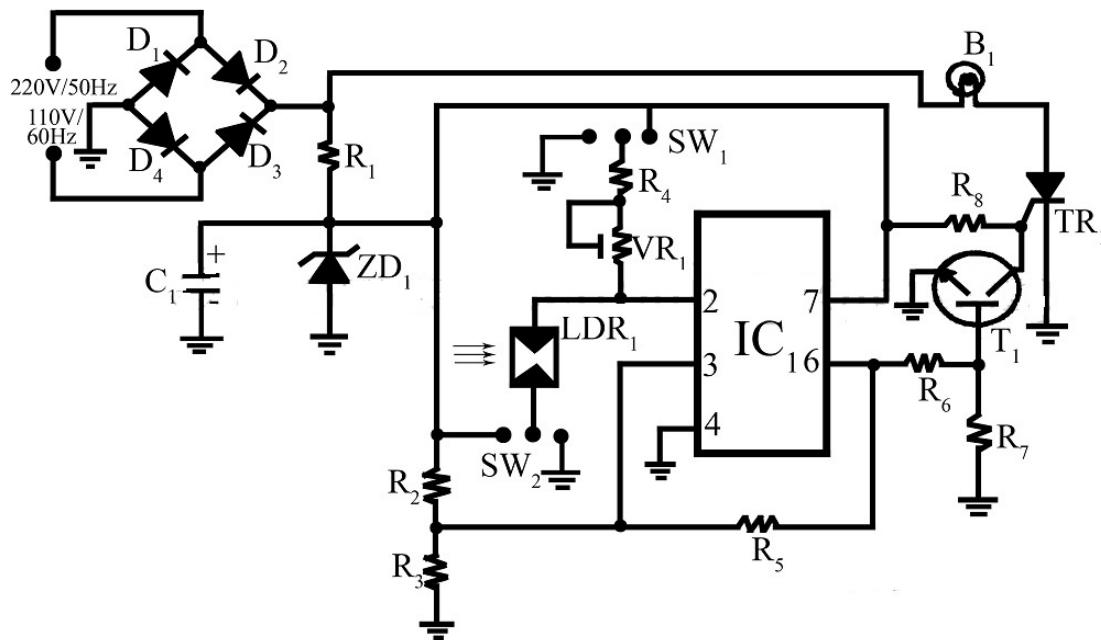


Figure: Circuit Diagram of Light Sensitive Switch

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1 = 100 K Ω /1W; R2, R3 = 100 K Ω ; R4 = 4.7 K Ω ; R5, R6 = 220 K Ω ; R7 = 68 K Ω ; R8 = 33 K Ω ; VR1 = 100 K Ω (preset)

Capacitors

C1 = 100 μ F/16

Semiconductors

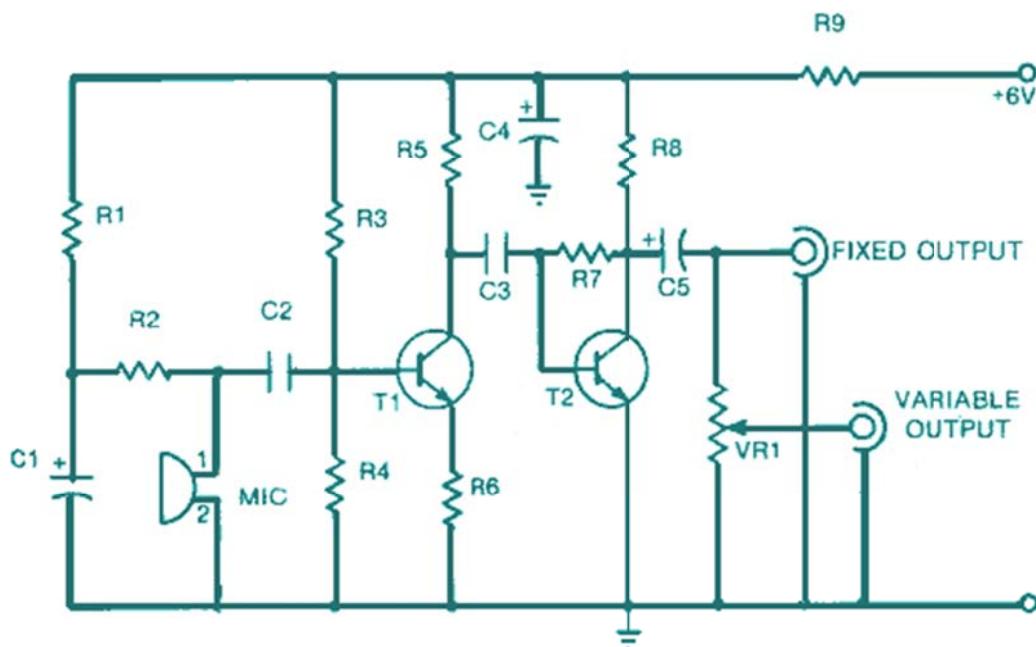
IC1 = LM741 (Op-amp); T1 = BC547; TR1 = 10GD (Triac); D1 – D4 = 1N4004; ZD1 = 10V /100 mW

Miscellaneous

LDR1 = Light – Dependent – Resistor; B1 = 200W bulb

283. Microphone Amplifier

If you are looking for the sensitive sound pick-up circuit then here is exactly what you are looking for. The circuit given in this site can be used as a different devices. It can be used as a simple microphone as well as with more exotic device as a sound operated alarm. This circuit is equally effective for a bugging device.



PART LIST

RESISTORS

R1=1.2 K Ω ; R2=2.7 K Ω ; R3=33 K Ω ; R4=6.8 K Ω ; R5=3.3 K Ω ; R6=100; R7=560 K Ω ; R8=4.7 K Ω ; R9=10 K Ω ; VR=11 K Ω

TRANSISTORS

T1=BC149C; T2= BC147B

Capacitors

C1=47 μ , 10V; C2,C3=0.1 μ ; C4=220 μ , 10V; C5=10 μ

Miscellaneous

BATT 6VOLT Battery

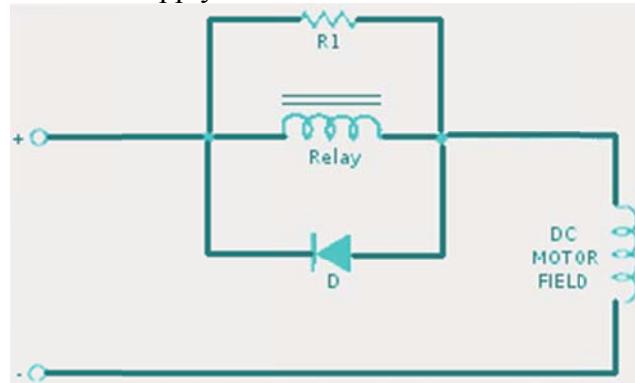
MIC Condenser Microphone
OTHERS PCB ,Connecting wires, hardware etc...

Circuit Diagram

Here in the circuit diagram you can see that microphone is employed as the transducer. The output of the condenser microphone is quite low so it has to connect with an FET amplifier. This amplifier circuit is powered by the R1,R2 resistor network. The output of condenser microphone is fed to a two-stage amplifier. Transistor T1 (BC149C) utilises current series feedback in the first stage. The second stage comprising transistor T2 is connected in the voltage shunt feedback configuration. These two stages provide sufficient gain to pick up even the slightest whisper. The amplifier circuit in the site requires 4.2 volt supply which can be obtained with a resistor R9 [1k]. The value of this resistor may be altered to suit a supply voltage other than 6 volts. Output of the microphone amplifier can be made variable by connecting a 10k potentiometer as shown in the circuit. Circuit's gain can be increased by reducing the value of R6 to 47 ohms or 22 ohms, depending on the input sensitivity of the main amplifier system. Increase in gain was also observed by using 3V supply and eliminating R9 altogether. The microphone should be housed in a small round enclosure.

284. Motor Protection

A DC motor is extensively used for industrial applications where a precise speed control and a constant torque are desired. It is inversely proportional to its field current. In case of field current failure, the motor speed will rise to dangerously high levels. A field failure protection is therefore necessary to cut off the armature supply in case of field current failure.



PART LISTS

RESISTOR

R1 Pick-up Resistor 5 Ohm, 25 W

R2 300 Ohm

All R 20K , 25W

S Shunt Regulator

FUSE

F1,F2,F3,F4 Fuse

DIODE

All 1N4007

LED Light Emitting Diode

CAPACITOR

C2,C3 N/O Contactor

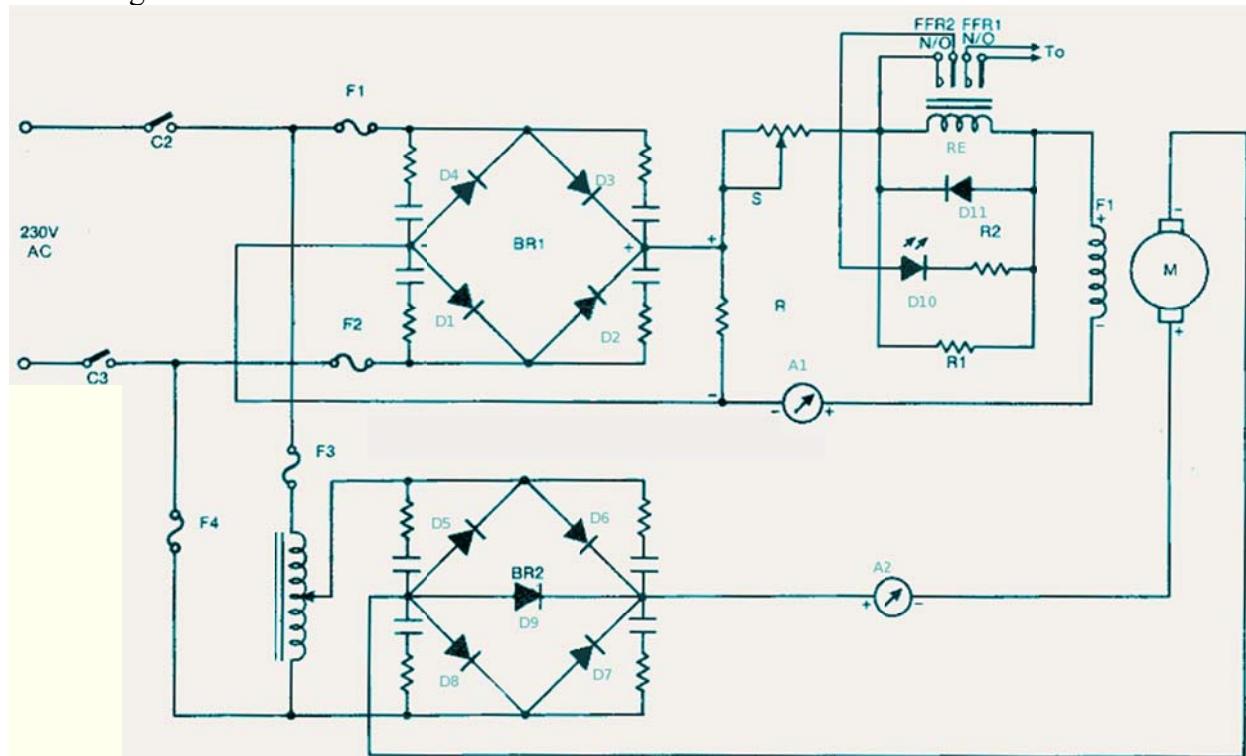
All 200μF

OTHERS

M=DC Motor; F1=Shunt Filed; RE=Field Failure Relay; A1=Field Ammeter; A2=Armature Ammeter

CIRCUIT DESCRIPTION

The basic circuit of the field failure protection uses an ordinary 6V electromagnetic relay of the open type with 10 amps rated sturdy contacts. This relay can be used on a manual autotransformer-controlled DC drive and motorised or thyristor controlled drives. This motor has a shunt field current of 1.13 amps at 220V DC. A 5-ohm (25~watt) wire-wound resistor (R1) connected in series with the motor field produces a 5.6-volt drop across resistor (R1) as long as the field current exists, thus energising the 6V DC relay connected across the resistor as shown in the diagram below



In case the motor field current fails due to any fault, the voltage drop across resistor (R1) will be zero which deenergizes the relay (FFR) and cuts off the armature supply.

The circuit diagram of a manual autotransformercontrolled DC drive of a 230V, 5HP DC motor with a separately excited shunt field of 230 volts (1.13 amps) and the FFR (field failure relay) circuit are shown in circuits diagram respectively. When the start pushbutton S2 is pressed, the contactor C is energised through S2 (N/O contact), limit switch S3 and stop pushbutton S1 contact). The limit switch S3 is actually a part of the autotransformer, and it is so mounted that its contacts remain closed only when the autotransformer setting is at zero position. At all other settings of the autotransformer, the limit switch contacts remain open. This is a safety device introduced, so that the motor can be started only from the minimum position of the

autotransformer setting, thereby starting at reduced voltage and current. If the motor is started on a high armature voltage, the starting current will be very high, especially if started on load, as is usually the case.

For more detail visit <http://electronicsproject.org/motor-protection/>

285. Multi Switch Controlled Relay

Now a days, controlling of appliance is simple with the help of electronics circuit and all of us want to control appliance in multi step. Here is a control circuit for relay which could very useful to control appliance with multi switch.

Circuit Description of multi switch controlled relay

This whole circuit of multi switch controlled relay is fabricated around four 2-input EX-OR gates IC CD4077. The logic of multi switch controlled relay is quite simple and can be understand by everyone. The truth table for EX-OR gates for different input is shown below.

The value of VCC can be varied from 9V to 15V.

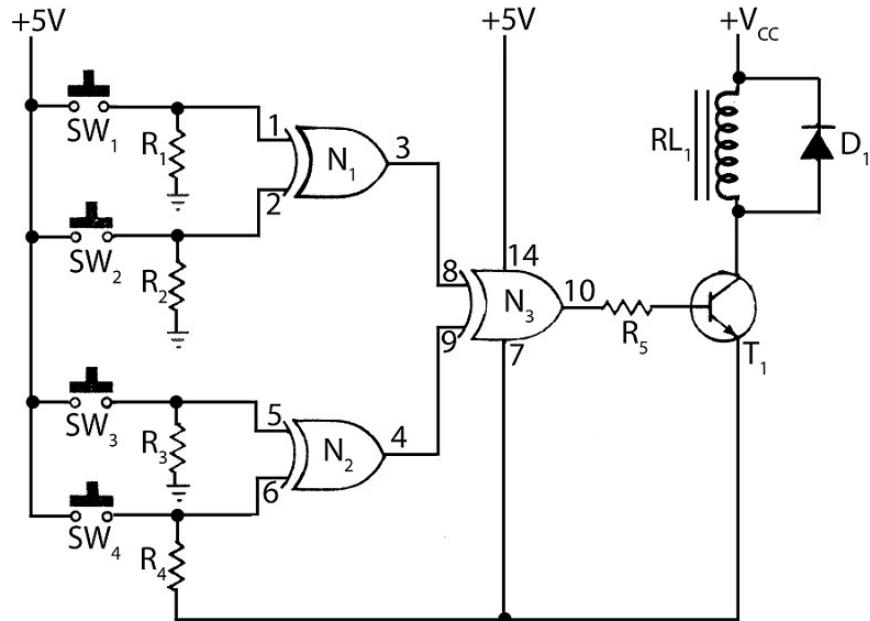


Figure 1: Circuit diagram of multi switch controlled relay

Truth Table

A	B	OUT
0	0	0
0	1	1
1	0	1
1	1	0

PARTS LIST

Resistors (all 1/4-watt, ± 5% Carbon)

R₁ – R₄ = 4.7 KΩ; R₅ = 15 KΩ

Semiconductors

IC1 = CD4077; T₁ = BC547B; D₁ = 1N4148

Miscellaneous

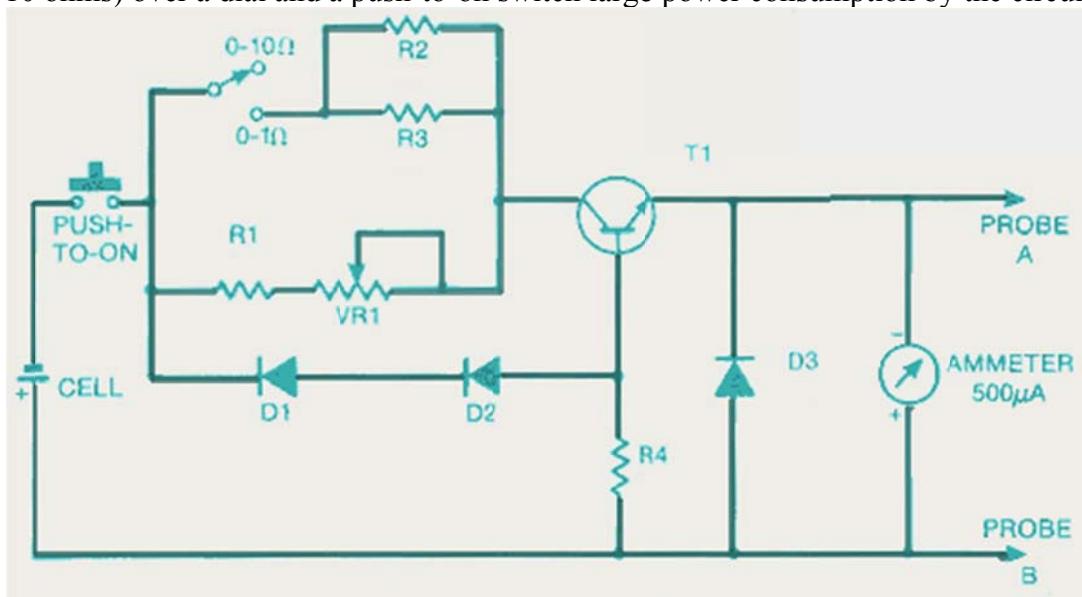
SW₁ – SW₄ = Push to on/off switch; RL₁ = 6V 100 Ω relay

Read more <http://electronicsproject.org/multi-switch-controlled-relay/>

286. Ohm Meter

The circuit diagram of the ohm meter in this site is very useful for measuring the low resistance range from 0 to 1 and 0 to 10. You can adjust the range according to your wish. The circuit for a low Ohm meter described here is simple and has the following advantages over other meters:

1. Do don't need to see it again and again just set it once and forget it forever).
2. Scale reading capacity of this circuit is from zero to a fixed value rather than infinity.
3. This meter is low power consuming as it uses a 1.5-volt penlight cell, two scales (0-1 ohms and 0-10 ohms) over a dial and a push-to-on switch large power consumption by the circuit.



Part List

RESISTORS

R1=27K; R2=3.3K; R3=3.3K; R4=330K; VR1=100 OHM

DIODES

D1=1N4001; D2=1N4001

CIRCUIT DESCRIPTION

The circuit diagram that you can see below is the ohm meter which can measure the resistance for 0 to 10 ohm . You can see the selector switch over there the circuit diagram which can select the measuring rang form 0 to 1 ohm and 0 to 10 ohms. Transistor T1 works as a constant current generator which passes a know current through the resistors which resistance is to be measured. If the maximum drop of the voltage across the emitter of the transistor T1 will be more than 100 mV and the ground is displayed on the meter whose internal resistance is much higher than the testing resistance that is 10 ohms. Because of which this ohm meter can not load the circuit.

There is a diode D3 across the micro ammeter which is use to protect the ohm meter from the overload during the absence of the testing resistor which resistance is to be measured.

Resistors R1, VR1 , R2 , R3 , D1 , D2 and R4 are biased by the transistor T1. Diodes D1 and D2 are used for holding the bias level constant inspite of the decaying battery.

The scale of the meter in this project should have 0-500 μ A . The shunt resistance in this project can be any general propose meter. Transistor T1 is the silicon npn with a high gain factor.

Now the meter should be adjust by shorting probes A and B. If the meter is adjust before the it shows a zero resistance. You only have to adjust in 0 to 10 ohm scale first and other adjustments will be follow automatically. This can be easily built within a few minutes. This is the very useful project for the electronics beginners.

Read more <http://electronicsproject.org/ohm-meter/>

287. Walky-talky without using inductor or coil

Walky-talky in this website is world 1st verified walky-talky project without using coil. Walky talky is very interesting and attain grabbing project for electronics hobbyist. Communication is done without any physical connection and mobile network up range of 500 meter. Almost all communication devices utilize coil which is burden for electronics hobbyist. So, we design this circuit without using any coil.

Circuit Descriptions of walky-talky

The entire circuit of walky-talky is divided into two main section transmitter and receiver section.

Transmitter section:- Transmitter section utilize IC NE566 (IC4) as VCO (Voltage Control Oscillator) for generating frequency about 30 KHz. Resistor R24 with Capacitor C24 used as frequency components for frequencies determination. Voice is pick-up by mike (MIC1) and changed it into equivalent electrical signal. Signal from microphone is amplified by transistor T4 and given to pin no 5 of IC4. NAND gate N1 with crystal oscillator XT4 finalizes the output from pin 3 of IC3. Lastly, signal from NAND N2 through N3 and N4 given to antenna for transmission.

Receiver section: - Transmitted signal from another walky-talky is received from same antenna which is used for transmission. Field effect transistor T1 boosts the received signal and make more powerful and send to amplifier section made from transistor T2 and T3 with crystal oscillator XT1 through XT3. Detector section is made from diode D1, Capacitor C6 and resistor R12. 30 KHz frequency is obtained from detector section.

Frequency of Phase Locked Loop IC NE565 (IC1) is adjusted by capacitor C9, resistor R17 and variable resistor VR1. Amplifier IC LM386 (IC2) is used to amplify the signal and given to speaker.

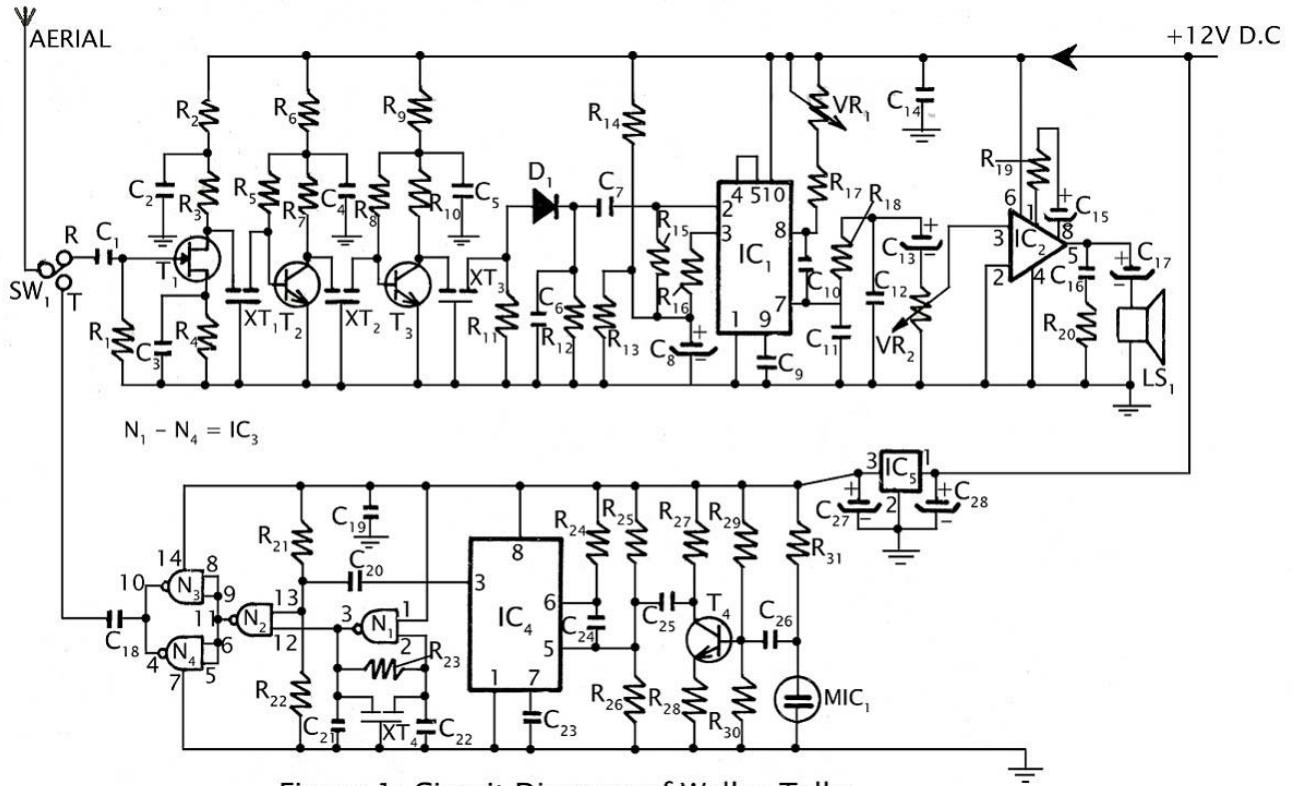


Figure 1: Circuit Diagram of Walky-Talky

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1 = 47 K Ω ; R2 = 100 Ω ; R3, R4, R11, R27 = 2.2 K Ω ; R5 = 330 K Ω ; R6, R10 = 560 Ω
 R7 = 1 K Ω ; R8 = 220 K Ω ; R9 = 100 Ω ; R12, R15, R16 = 4.7 K Ω ; R13, R31 = 10 K Ω
 R14 = 15 K Ω ; R17 = 1.8 K Ω ; R18 = 1.2 K Ω ; R19 = 1 K Ω ; R20 = 4.7 Ω ; R21, R22 = 100 K Ω
 R23 = 120 K Ω ; R24 = 5.6 K Ω ; R25 = 22 K Ω ; R26 = 150 K Ω ; R28 = 330 Ω ; R29 = 220 K Ω
 R30 = 47 K Ω ; VR1 = 4.7 K Ω ; VR2 = 22 K Ω

Capacitors

C1, C6, C10, C24 = 1 KpF; C2, C4, C5 = 47 KpF; C3 = 20 KpF; C7, C9, C23 = 2.2 KpF
 C8 = 4.7 μ F/16V; C11 = 22 KpF; C12, C16 = 0.1 μ F; C13 = 2.2 μ F/16 V; C14, C19, C25, C26 = 0.22 μ F; C15 = 10 μ F/16V; C17 = 220 μ F/16V; C18, C20 = 10 KpF; C21, C22 = 68 pF
 C27 = 1000 μ F/16V; C28 = 10 μ F/16V

Semiconductors

IC1 = NE565 (Phase Lock IC); IC2 = LM386 (Amplifier IC); IC3 = CD4011 (Quad 2-input NAND Gate IC); IC4 = LM566 (Voltage Controlled Oscillator); IC5 = LM7812 (Voltage Regulator); T1 = BFW10; T2, T3 = BF194; T4 = BC148; D1 = 1N4148

Miscellaneous

XT1 – XT4 = 10.7 MHz crystal; SW1 = Single pole double throw switch; LS1 = 8 Ω speaker
 MIC1 = Condenser microphone; Areal

Read more <http://electronicsproject.org/walky-talky-without-using-inductor-or-coil/>

288. 70/40 Watts Hi-Fi amplifier

Here is a circuit of the world best Hi-Fi amplifier you may never have to replace by a better one. The high output, good specification, and small size make this 70/40 watts hi-fi amplifier more versatile.

Circuit description of 70/40 watts hi-fi amplifier

The 70/40 watts hi-fi amplifier circuit is build around transistors, configured in various modes. The signal to be amplified is given to base of transistor T1 configured as differential amplifier with T2. Transistor T3 is used to maintain the current of differential amplifier.

Transistor T4 with T5 forms a cascaded pair derived directly by transistor T1. For better result transistor T6 and T7 again configured as cascaded pair and provide constant current source to cascade pair T4 and T5 in this amplifier circuit.

Temperature coefficient of transistors T10 and T11 is compensated by transistors T8 and T9 which act like diodes. Transistors T10 with T12 & T14 and transistors T11 with T13 & T15 form a triple Darlington pairs.

The current through T4 and T5 is kept at a low value of about 6mA because the output of this circuit consists of triple Darlington pairs. The small change in the VBE of T10 and T11 changes output current of hi-fi amplifier greatly.

In order to prevent distortion in the 70/40 watts hi-fi amplifier when capacitive loads are connected to the output, coil L1 is used. Fuse is used to prevent DC voltage across the speaker and is connected in series to speaker. The total gain of this amplifier circuit is approximate 32 and its value is calculated by $(R7 + R8)/R8$.

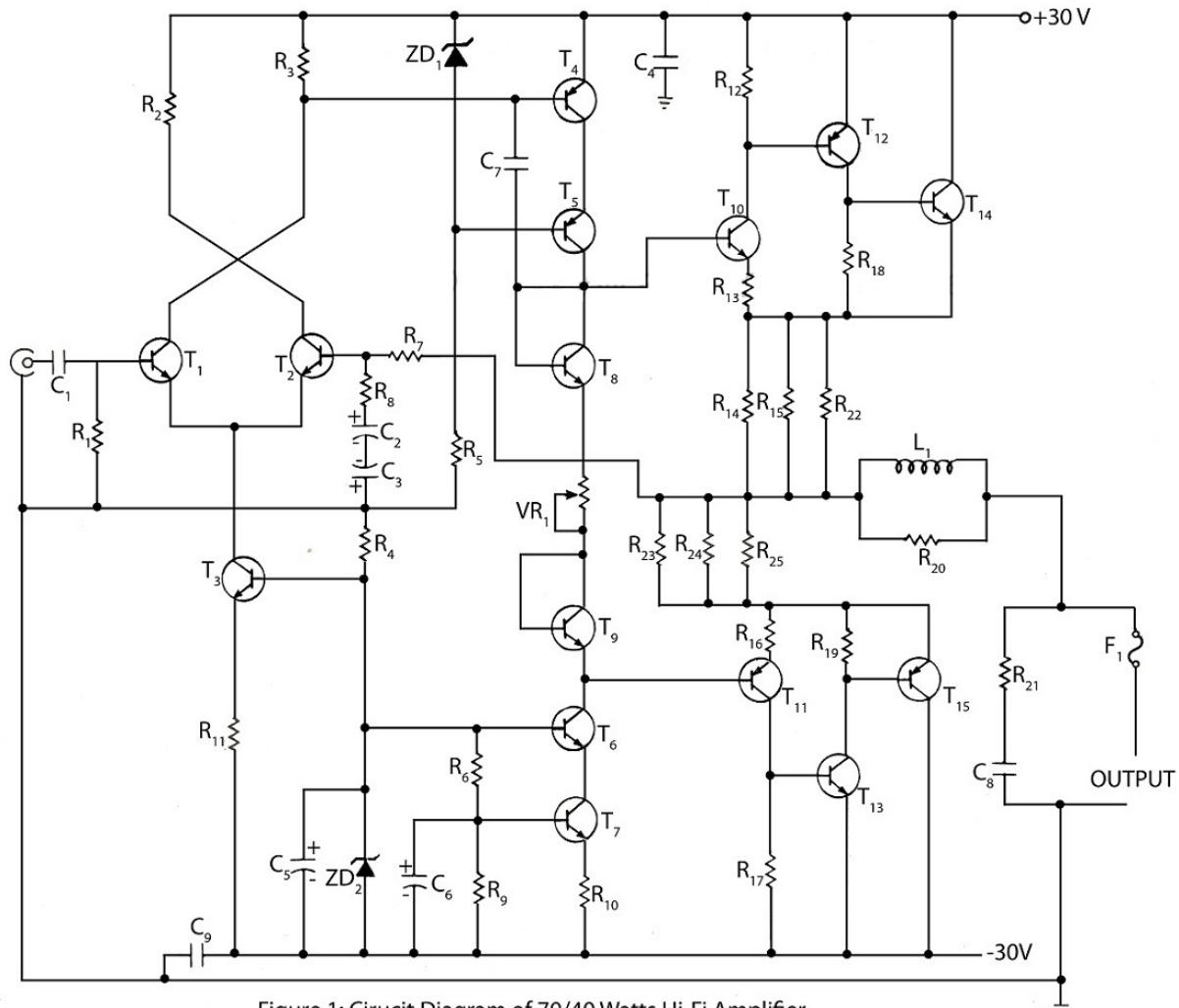


Figure 1: Circuit Diagram of 70/40 Watts Hi-Fi Amplifier

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1, R7 = 100 K Ω ; R2, R3, R9 = 1.2 K Ω ; R4, R5, R6 = 2.7 K Ω /2W; R8 = 4.7 K Ω

R10, R13, R16, R18, R19 = 100 Ω ; R11 = 3.3 K Ω ; R12, R17 = 680 Ω

R14, R15, R22, R23, R24, R25 = 1 Ω /2W; R20 = 10 Ω /2W; R21 = 10 Ω /1W; VR1 = 100 Ω

Capacitors

C1 = 1 μ F/polyester; C2, C3 = 25 μ F/25V electrolytic; C4, C8, C9 = 0.1 μ F polyester

C5 = 10 μ F/60V electrolytic; C6 = 4.7 μ F/10V electrolytic; C7 = 56 pF ceramic disc

Semiconductors

T1, T2, T3 = BC546B; T4 = BC558B; T5, T11 = 2N4033; T6, T10 = 2N3019; T7 = BC548B

T8, T9 = BC147B; T12 = BD140; T13 = BD139; T14 = 2N3055; T15 = MJ2955

ZD1 = 3.3V 400mW zener diode; ZD2 = 3.9V, 400mW zener diode

Miscellaneous

L1 = Coil having 20 turns of 20 SWG over thin pencil; F1 = 3.5 Ampere fuse

SPECIFICATIONS

Output power (1 KHz, 0.7% THD): 73W into 4- Ω and 44W into 8- Ω

Offset Voltage: Less than $\pm 40\text{mV}$; Input impedance: $100 \text{ k}\Omega$; Harmonic distortion : 0.015%; Intermodulation distortion (70W): 0.02%; Frequency range: 10 Hz – 30 KHz, $\pm 2\text{dB}$; Signal-to-noise ratio (out = 100mW): Over 72dB

Read more <http://electronicsproject.org/7040-watts-hi-fi-amplifier/>

289. Electronics counter

Simple counting can be done by anyone but counting in interval up to large number is tedious and the chance of forget is maximum. As, we have already published Counter Circuit | Digital Counter. Now , here electronics counter is second project by dreamlover technology in the series of counting based project. Both the counting circuit published in this website counts up to 10,000 with the help of four seven-segment displays. The difference is previous circuit utilize CMOS ICs where the electronics counter use TTL ICs.

Circuit description

The entire circuit of electronics counter is divided into three main section :- input, display and driver or decoder section.

The input circuit consists of LDR following by negative square wave generator circuit build around Timer IC (NE555). A bulb is used here as light source focused on LDR. The property of LDR is that whenever the light focused on base of LDR is obstructed, it gives trigger and square wave is generated and given as input signal to counter circuit. So the objects to be counted are arranged in a row to move one by one in between the light source and the LDR.

IC2 shows any number between 0-9 according to input square wave given to pin no 14. After each negative pulse a carrying pulse is produced by decoder IC and given to another one (i.e. from IC2 to IC3, IC3 to IC4, IC4 to IC5). IC5 and IC6 is BCD to 7-segment latch decoder driver. The reset switch SW1 is used to reset the electronics counter to 0000 states.

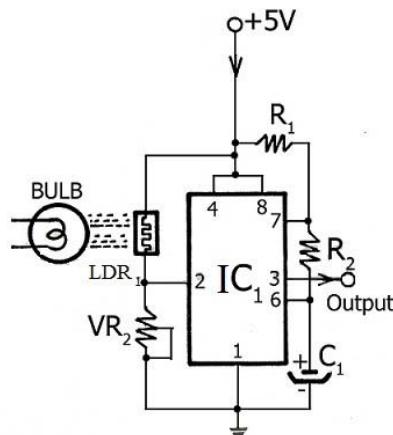


Figure 1: Circuit Diagram of Electronics Counter LDR operator

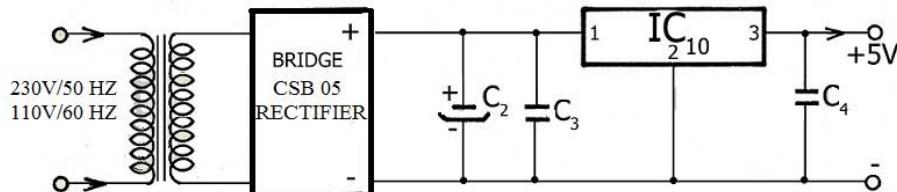


Figure 2: Circuit Diagram of Power Supply for Electronics Counter

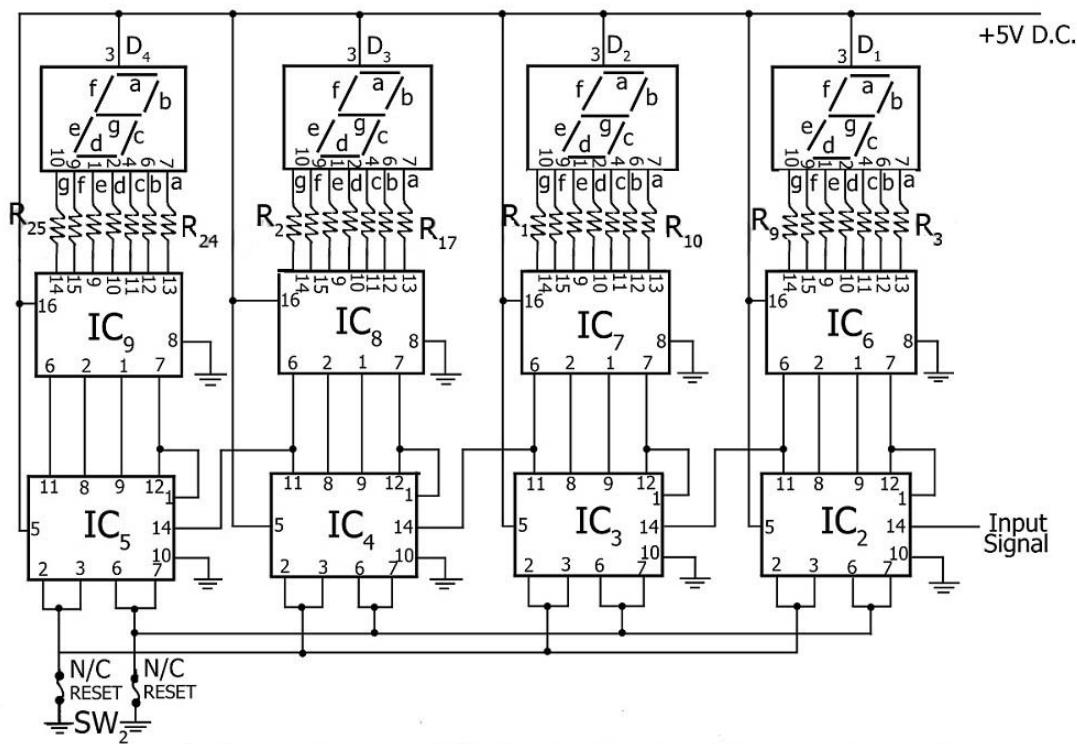


Figure 2: Circuit Diagram of Electronics Counter using Decade counter

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

$R_1 = 1\text{ K}\Omega$; $R_2 = 100\text{ K}\Omega$; $R_3 - R_{30} = 180\text{ }\Omega$; $VR_1 = 100\text{ K}\Omega$ preset

Capacitors

$C_1 = 4.7\text{ }\mu\text{F}$; $C_2 = 1000\text{ }\mu\text{F}/10\text{V}$; $C_3, C_4 = 0.1\text{ }\mu\text{F}$

Semiconductors

$IC_1 = NE555$ (Timer IC); $IC_2 - IC_5 = 7490$ (Decade and Binary counter)

$IC_6 - IC_9 = 7447$ (BCD to 7-segment decoder); $IC_{10} = \mu\text{A }7805$ (Voltage Regulator)

$D_1 - D_4 = \text{Display FND } 507$

Miscellaneous

$Mic_1 = \text{Microphone}$; $B_1 = \text{Bulb}$; LDR

Read more <http://electronicsproject.org/electronics-counter/>

290. Clap operated Remote Control for Fans

Here is the circuit of clap-operated remote control fans is used to control not only switching properties but also control speed of fan. The main advantage of clap operated remote control for fan is, it can control up to ten-step speeds of fan where normally a fan has three to five step speeds.

Circuit description clap operated remote control for fan

This entire circuit clap operated remote control for fan is divided into four major section i.e. sound-operated trigger pulse generator, clock pulse generator, clock pulse counter and load operator.

Sound-operated trigger pulse: – The heart of this section is transistor T1 BC148, configured as class-C amplifier mode. The MIC1 is used to change voice signal into its corresponding electrical signal and is given to base of transistor T1 in order to amplify and increase its intensity.

Clock pulse generator:- This section is build around timer IC NE555 and configured as monostable multivibrator. The trigger pulse generated by transistor T1 is given to pin 2 of IC1 and time period (T) for output high is calculated by formula.

$$T = 1.1RC$$

Clock Pulse counter:- This section is build around decade counter CD4017BC which counts the clock pulse generated by timer IC (IC1). The output from IC1 is given to pin 14 of IC2. IC2 has ten outputs, viz, 0, 1, 2, 3, 4.....9. Here we use only three outputs i.e. output 1, 2 and 3 from pin 2, 4, and 7 respectively. Output 4 from pin 10 is directly connected to reset pin 15.

Load operator:- This section is build around three transistor as relay driver to operate three separate relay. Output from each pin of IC2 is given to base of each transistor through 100Ω and LED as shown in circuit diagram. Output is taken from collector of transistor and is connected to relay. The three LEDs used to indicate gear or speed i.e. LED1, LED2 & LED3 indicates gear 1, gear 2 & gear 3 respectively.

NOTE:-This circuit used to operate in 1st speed similarly, 2nd clap for 2nd speed, 3rd clap for 3rd speed and 4th clap to switch off the fan.

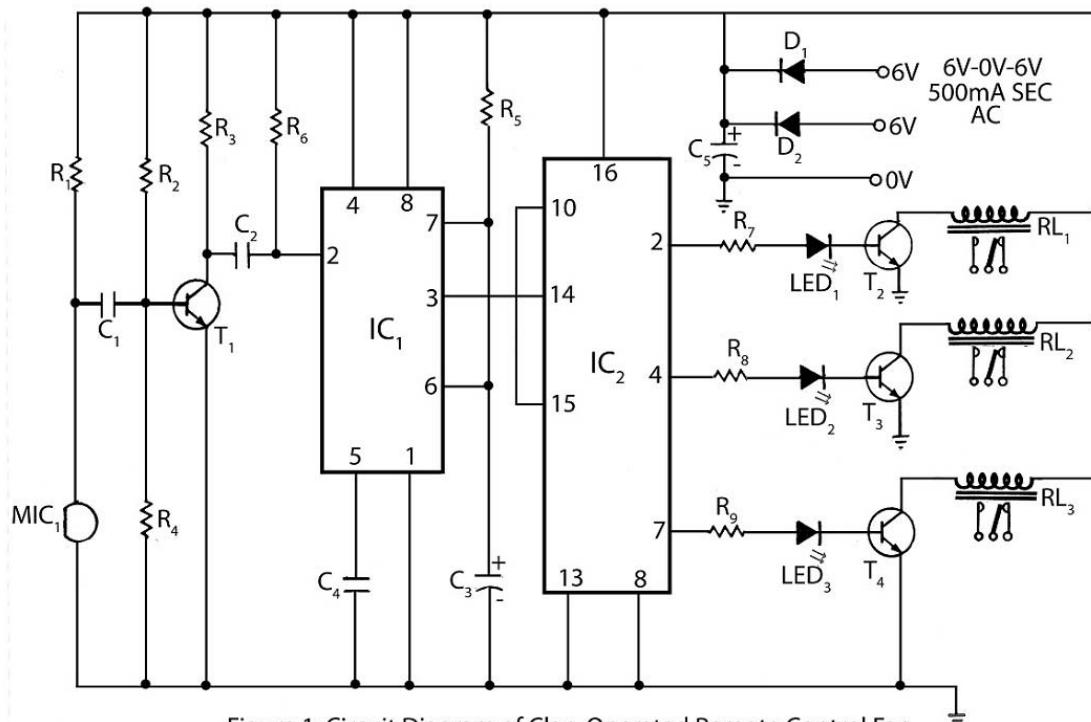


Figure 1: Circuit Diagram of Clap-Operated Remote Control Fan

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R1 = 10 K Ω ; R2 = 1.2 M Ω ; R3 = 2.2 K Ω ; R4 = 150 K Ω ; R5 = 220 K Ω ; R6 = 10 K Ω ; R7, R8, R9 = 100 Ω

Capacitors

C1, C2 = 0.1 μ F/16V; C3 = 4.7 μ F/16V; C4 = 0.01 μ F (ceramic disc); C5 = 1000 μ F/12V

Semiconductors

IC1 = NE555 (Timer IC); IC2 = CD4017BE (decade counter); T1 = BC148; T2, T3, T4 = BEL187; D1, D2 = 1N4001 silicon diode

Miscellaneous

MIC1 = Condenser microphone 34LOD; LED1 = Green; LED2 = yellow; LED3 = RED
6V-0V-6V, 500mA secondary transformer

Read more <http://electronicsproject.org/clap-operated-remote-control-for-fans/>

291. Fire Alarm Using Thermistor

Many fire alarm circuit is published in different website. But, here in this website is a simple and inexpensive project of fire alarm using thermistor. where thermistor is used as temperature sensor of fire alarm. Working principle of thermistor is same as LDR (change their resistance with change in heat where LDR change their resistance with change in light fall on it).

Circuit Description of fire alarm using thermistor

The whole circuit of fire alarm using thermistor is build and fabricated around thermistor (TH1) and timer IC (IC1) with its driver transistor. The timer IC (IC1) used in this circuit is as astable multivibrator oscillator used to oscillate in audio frequency band. The two transistor T1 and T2 used to drive the timer IC (IC1). The output from pin 3 of IC1 is fed to loudspeaker through transistor T3 to generate sound. The value of resistor (R5 and R6) and capacitor (C2) determines the frequency of IC2.

The low resistance path of extend positive voltage to the base of transistor is provided when the thermistor TH1 become hot. Further collector of transistor T1 is connected to base of transistor T2 provides positive voltage to reset pin 4 of IC1 for reset. Fire alarm using thermistor circuit works on wide range of input power supply voltage i.e. 6v to 12V.

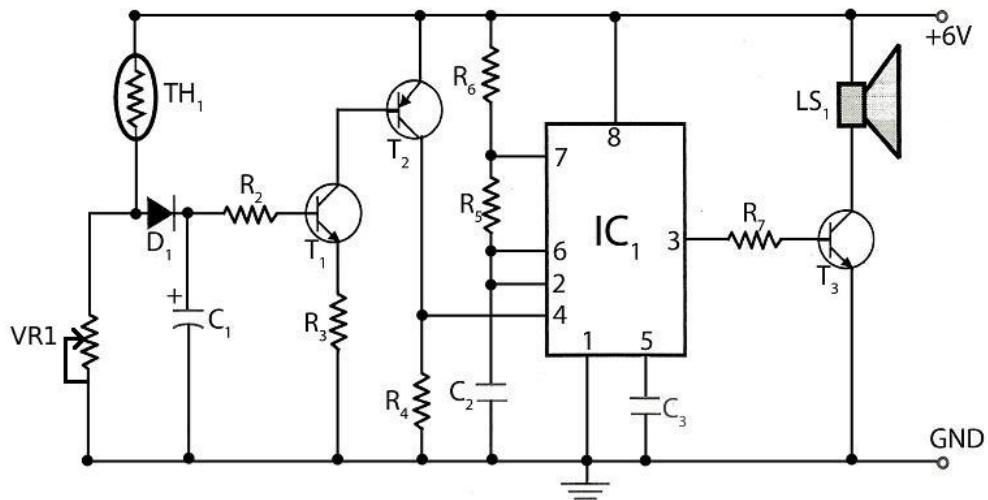


Figure 1: Circuit Diagram Of Fire Alarm Using Thermistor

PARTS LIST

Resistors (all 1/4-watt, ± 5% Carbon)

VR1 = 10 Kohms Variable Resistor for changing the sensitivity of the circuit.

R3, R7, R8 = 470 Ω; R2 = 33 K Ω ; R4 = 560 Ω; R5 = 47 KΩ; R6 = 2.2 KΩ

Capacitors

C1 = 10 µF/16V; C2 = 0.04 µF; C3 = 0.01 µF

Semiconductors

IC1 = NE555 (timer IC); T1 = BC548; T2 = BC558

T3 = SL100B or any Medium power general purpose NPN transistor like: 2N4922 , 2N4921,2N4238, FCX1053A

D1 = 1N4001

Miscellaneous

TH1 = Thermistor 10 K Ω

LS1 = 8 Ω , 1W speaker

292. Mobile cellphone charger

While travelling charging of mobile battery is great problem because power supply source is not generally accessible. Here is a simple project using very common electronics components for charging mobile battery using AA cells.

Circuit descriptions of mobile cellphone charger

The main part of the circuit mobile cellphone charger is timer IC NE555, used to charge and monitor the voltage level. IC1 get control voltage to pin 5 by zener diode ZD1-. Threshold pin 6 and trigger pin 2 is supplied with a voltage set by VR1 and VR2 respectively. The trigger pin 2 of IC1 is below 1/3VCC when discharge battery is connected to the circuit as a result flip-flop of IC1 is switched on to take output pin 3 high. The process is reversed when battery is fully charged of charged battery is connected. Here transistor T1 used to enhance the charging current from output pin 3 of IC1. Adjust potentiometer VR1 and VR2 as per require.

LED status for different charging conditions

Load across the output	Output frequency (at pin 3)	LED ₁
No battery connected	765 kHz	On
Charging battery	4.5 Hz	Blink
Fully charged battery	0	Off

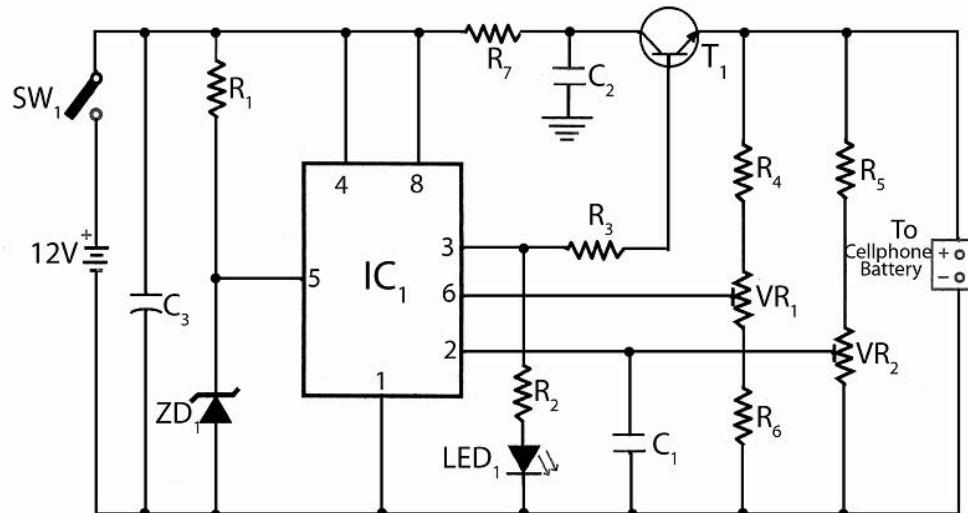


Figure 1: Mobile Cellphone Charger

PARTS LIST

Resistors (all 1/4-watt, $\pm 5\%$ Carbon)

R1 = 390 Ω ; R2 = 680 Ω ; R3 = 39 Ω /1W; R4 = 27 K Ω ; R5 = 47 K Ω ; R6 = 3.3 K Ω ; R7 = 100 Ω /1W; VR1, VR2 = 20 K Ω

Capacitors

C1 = 0.001 μ F (ceramic disc)

C2 = 0.01 μ F (ceramic disc)

C3 = 4.7 μ F/25V (Electrolytic)

Semiconductors

IC1 = NE555 timer IC

T1 = SL100 or any Medium power general purpose NPN transistor like: 2N4922 ,
2N4921,2N4238, FCX1053A

ZD1 = 5.6 V/1W

LED1

Miscellaneous

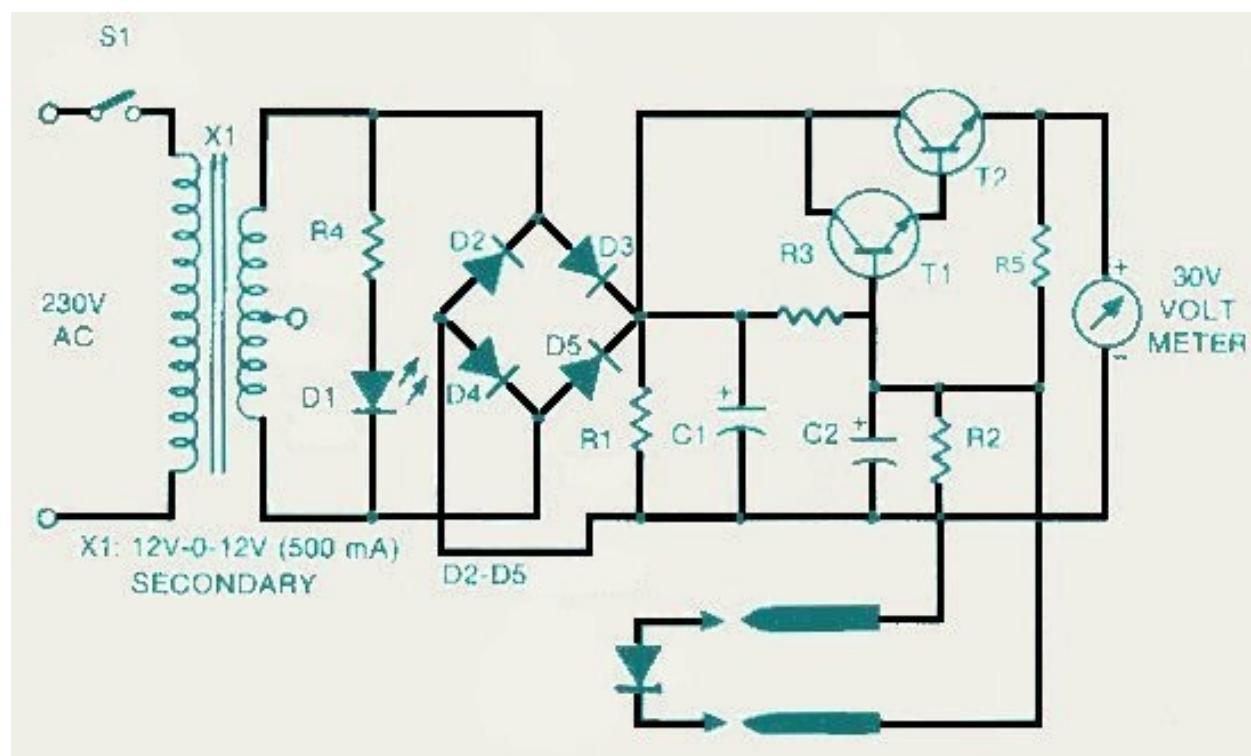
SW1 = On/off switch

1.5V*8 AA cells

Mobile connector

293. Test a Diode | Zener Diode

Here you can get the diode tester circuit for general purpose using diode. You can also test a zener diode by the use of this circuit too. The circuit diagram of the diode tester here is made of simple Transistors and resistors. Any kind of IC is not used in this circuit so it will be easy for the electronics beginners for understanding the working principal of diode tester in this circuit.



PART LISTS

RESISTORS

R1=2.2K; R2=10K; R3=680 Ohm; R4=1.2 K; R5=10K , 0.5W

TRANSISTORS

T1= BC147B; T2=SL100

CAPACITORS

C1=470 μ 35V; C2=1 μ 40V

DIODES

D1=LED; D2 -D5=1N4001

OTHERS

S1=ON/OFF Switch; X1=12V-0-12V Transformer

Volt Meter 30V

Probe 2 pieces

CIRCUIT DESCRIPTION

Here we used the 12-0-12 step-down 500mA power transformer. The output of the transformer is supply to the bridge rectifier made of D2 , D3, D4, D5 which is use to convert the Ac supply to the DC supply. Capacitor C1 is used as a filter the DC output. We used 470 μ F capacitor but you can used any. More the value of capacitor more pure DC can be obtained. Resistor R2 of 2.2K is used as bleeder. Here you can see the transistor T1 [BC147B] and transistor T2 [SL100] are use for regulator compressor. The DC output is fed to these transistors. T1 acts as a series pass driver or a current regulator. Base bias for transistor T1 is achieved from the supply through resistor R3 of 680 ohms as resistor R2 of 10k is a base bleeder and capacitor C2 1 μ F filters base potential. When the test probe is fully open with no zener connected, the base potential of transistor T1 is around 32V that is across resistor R4 or capacitor C2.

Transistor T1 [BC147B] provides the base potential for transistor T2 [SL100] which acts as a series pass regulator, providing the net DC voltage equivalent to T1 base potential which is fed to the voltmeter.

Now, the voltmeter reads around 30V with no zener diode connected across the probe. When a zener diode is connected across the test probe, the base potential of transistor T1 falls to zener diode breakdown voltage. With this, the base potentials for transistor T2 and transistor T1 become equal. The meter now shows the actual zener voltage. An adjustment of 0.6 V can be done on the meter scale by shifting the needle with zero adjustment screw on the meter.

PARTS LIST

Resistors (all 1/4-watt, \pm 5% Carbon)

R1 = 100 K Ω ; R2 = 39 K Ω ; R3 = 2.2 K Ω ; R4 = 680 Ω ; R5 = 100 Ω ; VR1 = 4.7 K Ω ; VR2 = 10 K Ω

Capacitors

C1 = 27 KPF (273); C2, C4 = 2.2 μ F/16 V; C3 = 22 μ F/16 V; C5, C10 = 100 μ F/16 V; C6 = 10 μ F/16 V; C7 = 100 KPF (104); C8 = 47 KPF (473); C9 = 220 μ F/16 V

Semiconductors

T1 = BC147B; IC1 = LM386 power amplifier

Miscellaneous

L1 = Pick up Coil

Speaker 8 Ω

SW1 = On/Off switch

294. Sound Pressure Meter

Here is a simple circuit of “Sound Pressure Meter” to check the pressure of sound. An am-meter of few micro-amperes is used in its output in order to show the deflection corresponding to intensity of sound.

Circuit description

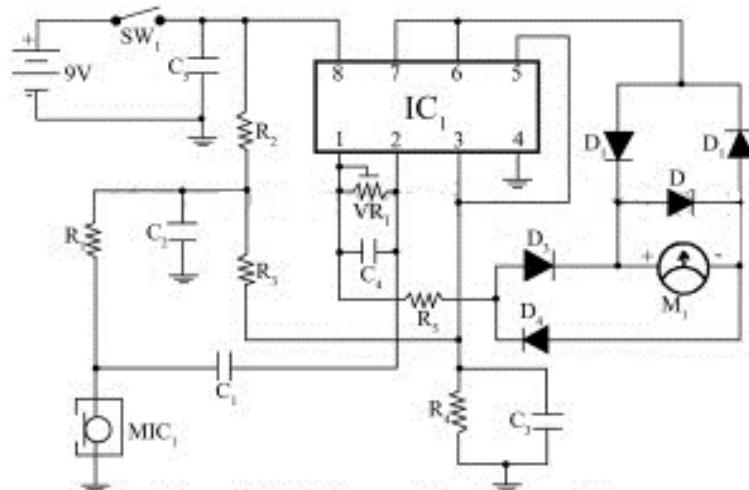


Figure 1: Circuit Diagram of Sound Pressure Meter

The circuit sound pressure meter utilizes a microphone, an operational amplifier, and a moving coil am-meter. Microphone pick-up the sound to be measured and change it into electrical signal corresponding to intensity of sound. The output of microphone is given to pin 2 of IC1 (TLC272) through bipolar capacitor C1, where IC1 is a 2-operational amplifier. Variable resistor VR1 is used to select the amplification power connected to pin 1 and 2. The reference voltage is given to non-inverting pin (pin 3) of IC1 through resistor R3 and R4. As TLC272 (IC1) is a combination of two individual operational amplifier, so for further amplification of half voltage of voltage at non-inverting input (pin 3) second operational amplifier is used.

A moving coil am-meter of 30 μ A range having internal resistance of 6.5 K Ω is used in its output.

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

R₁ = 10 K Ω ; R₂ = 220 Ω ; R₃, R₄ = 100 K Ω ; R₅ = 8.2 K Ω ; VR₁ = 500 K Ω (preset)

Capacitors

C₁ = 10 μ F/40V; C₂ = 470 μ F/16V; C₃ = 4.7 μ F/63V; C₄ = 15 pF; C₅ = 100 KpF

Semiconductors

IC₁ = TLC272 (2-operational amplifier); D₁ – D₄ = BAT85; D₅ = 1N4148

Miscellaneous

SW₁ = On/Off switch; M₁ = 30 μ A/6.5 K Ω (am-meter); MIC₁ = MCE2000

295. Sound Operated Light

While living in rent or in hostel the problem like stealing is often in absent time. Here is the circuit of simple and inexpensive sound – operated light to overcome this type of problem which can turn on the light when someone claps, or tries to open your door or even inserts a key in the door lock. The switching of light is alternately i.e. light on by one sound pulse and off by another. It is also called clap operated light or clap switch.

Circuit Description of sound operated light

The entire circuit of sound operated light is designed and builds around an operational amplifier IC (IC1) and JK flip-flop IC (IC2). The sound coming from outside is sensed by microphone and converts it to corresponding electrical signal where sensitivity of sound is controlled by potentiometer VR1. The high value of reference voltage is given to pin 3 of IC1 in order to change the output voltage from pin 6. Here IC2 (JK flip-flop) is wired as a toggle flip-flop and its output is connected to relay driver transistor T1 through resistor R1 which energized the relay RL1 when sound is heard by microphone. The bulb from sound operated light is connected to AC source through relay contact as shown in circuit diagram.

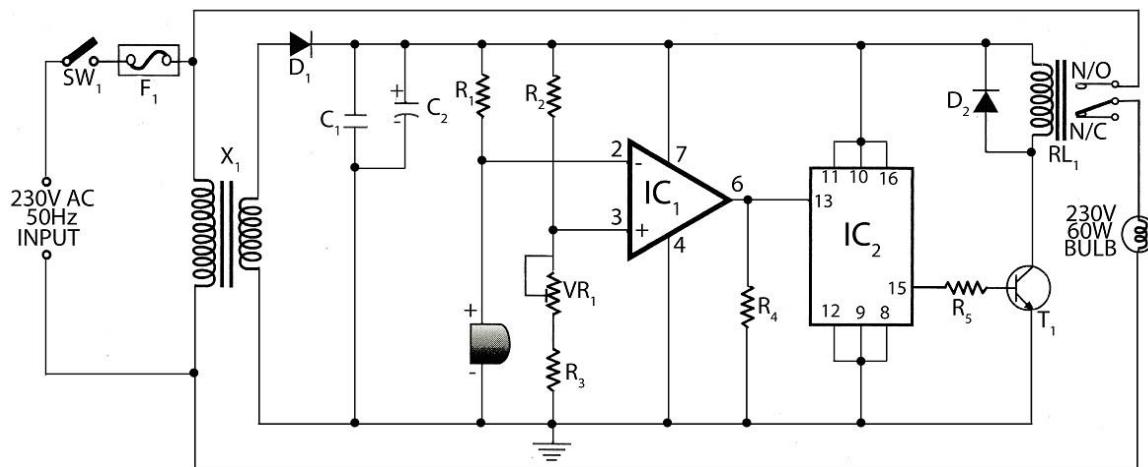


Figure 1: Circuit diagram of sound operated light

PARTS LIST

Resistors (all $\frac{1}{4}$ -watt, $\pm 5\%$ Carbon)

$R_1 = 22\text{ k}\Omega$; $R_2, R_5 = 1\text{ k}\Omega$; $R_3 = 470\text{ }\Omega$; $R_4 = 10\text{ k}\Omega$; $VR_1 = 10\text{ k}\Omega$

Capacitors

$C_1 = 0.1\text{ }\mu\text{F}$; $C_2 = 470\text{ }\mu\text{F}/35\text{V}$

Semiconductors

$IC_1 = \mu\text{A741}$ (operational amplifier); $IC_2 = CD4027$; $T_1 = 2N2222$; $D_1, D_2 = 1N4001$

Miscellaneous

$X_1 = 230\text{V AC primary to }0\text{-}9\text{V, }250\text{ mA secondary transformer}$

OR

($110\text{V AC primary to }0\text{-}9\text{V, }250\text{ mA secondary transformer}$)

$RL_1 = 12\text{V, }200\Omega, 1\text{C/O Relay}$

$SW_1 = \text{ON/OFF Switch}$

$F_1 = \text{Fuse, MIC = Condenser Microphone, Bulb }230\text{V, }60\text{W (110V, 60W)}$

296. Solar Tracking System

Generally, solar panels are stationary and do not follow the movement of the sun. Here is a solar tracker system that tracks the sun's movement across the sky and tries to maintain the solar panel perpendicular to the sun's rays, ensuring that the maximum amount of sunlight is incident on the panel throughout the day. The solar tracker starts following the sun right from dawn, throughout the day till evening, and starts all over again from the dawn next day.

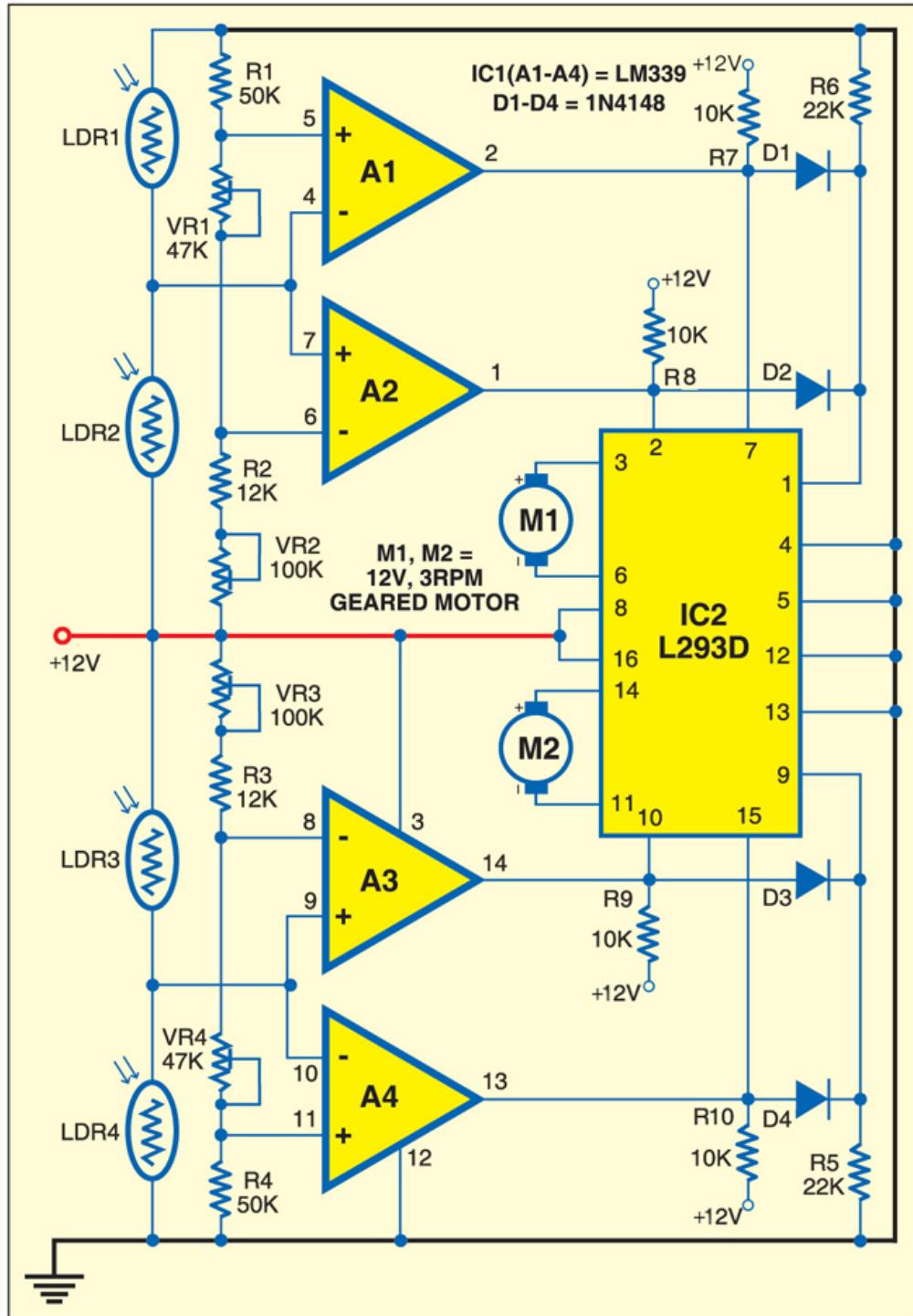
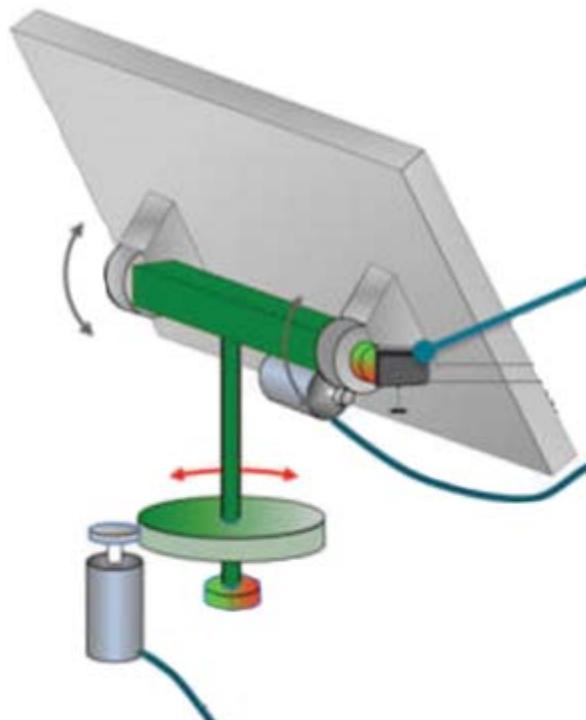


Fig. 1 shows the circuit of the solar tracking system. The solar tracker comprises comparator IC LM339, H-bridge motor driver IC L293D (IC2) and a few discrete components. Light-dependent resistors LDR1 through LDR4 are used as sensors to detect the panel's position relative to the sun. These provide the signal to motor driver IC2 to move the solar panel in the sun's direction. LDR1 and LDR2 are fixed at the edges of the solar panel along the X axis, and connected to comparators A1 and A2, respectively. Presets VR1 and VR2 are set to get low comparator output at pins 2 and 1 of comparators A1 and A2, respectively, so as to stop motor M1 when the sun's rays are perpendicular to the solar panel.

When LDR2 receives more light than LDR1, it offers lower resistance than LDR1, providing a high input to comparators A1 and A2 at pins 4 and 7, respectively. As a result, output pin 1 of comparator A2 goes high to rotate motor M1 in one direction (say, anti-clockwise) and turn the solar panel.

When LDR1 receives more light than LDR2, it offers lower resistance than LDR2, giving a low input to comparators A1 and A2 at pins 4 and 7, respectively. As the voltage at pin 5 of comparator A1 is now higher than the voltage at its pin 4, its output pin 2 goes high. As a result, motor M1 rotates in the opposite direction (say, clock-wise) and the solar panel turns.



Similarly, LDR3 and LDR4 track the sun along Y axis. Fig. 2 shows the proposed assembly for the solar tracking system.

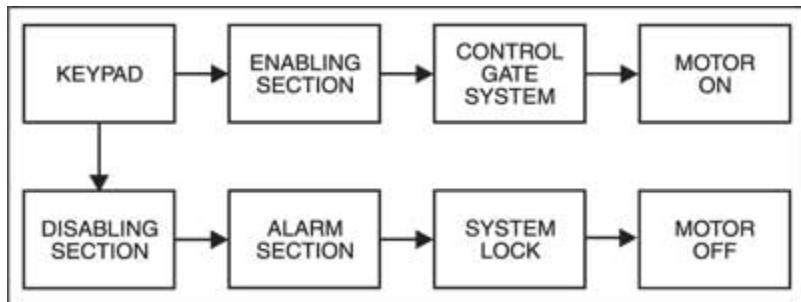
For more detail visit...

http://electronicsforu.com/electronicsforu/circuitarchives/view_article.asp?sno=745&article_type=1&id=674&tt=unhot&b_type=new

297. Simple Key-Operated Gate Locking System

This simple key-operated gate locking system allows only those persons who know the preset code to open the gate. The code is to be entered from the keypad within the preset time to operate the motor fitted in the gate. If anyone trying to open the gate presses a wrong key in the keypad, the system is disabled and, at the same time, sounds an alarm to alert you of an unauthorised entry.

Figs 1 and 2 show the block and circuit diagrams of the key-operated code locking system, respectively. Connect points A, B, C, D, E, F and ground of the circuit to the respective points of the keypad. Keys S7, S16, S14 and S3 are used here for code entry, and the remaining keys are used for disabling the system. It is very important to press the keys in that order to form the code. To start the motor of the gate, press switches S7, S16, S14 and S3 sequentially. If the keys are pressed in a different order from the preset order, the system will lock automatically and the motor will not start.



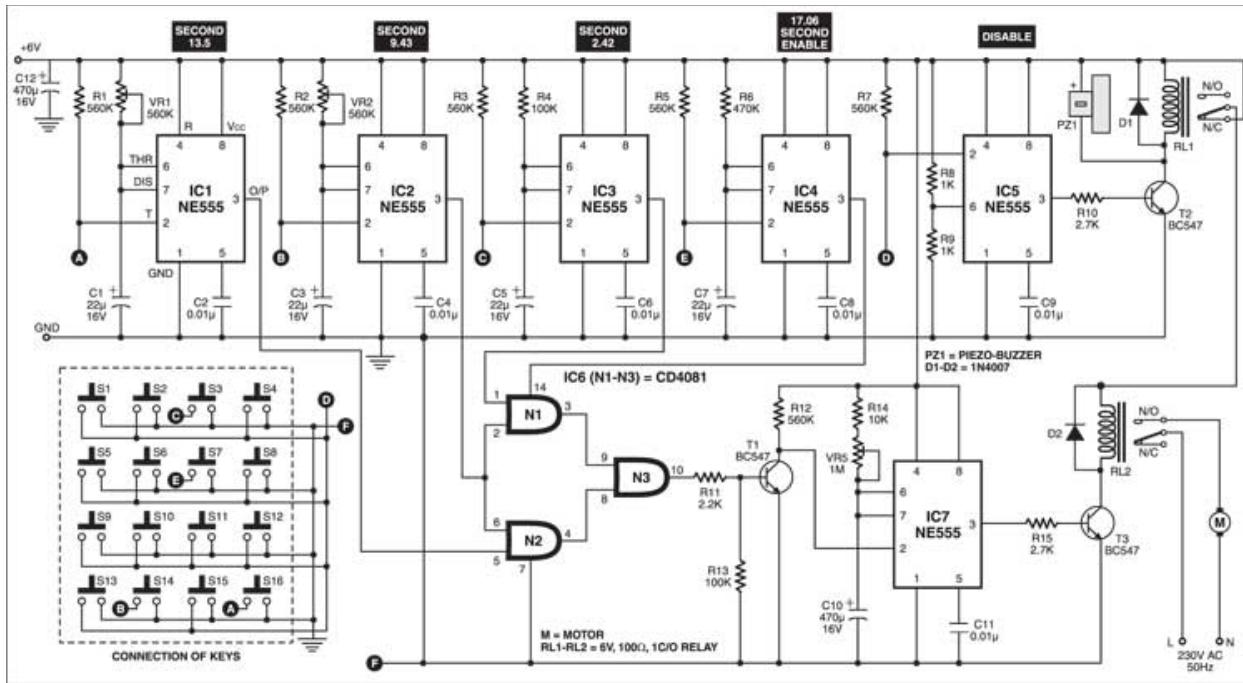
Initially, 6V is not available at pin 14 of AND gate IC6, so no pulse reaches the base of npn transistor T1 to trigger timer IC5 and, as a result, the gate doesn't open. To enable the system, first you have to trigger IC4. Pressing switch S7 triggers timer IC4 to provide 6V to IC6 for approximately 17 seconds. Within this time, you have to press switches S16, S14 and S3 sequentially. As a result, the outputs of timers IC1, IC2 and IC3 sequentially go high. These high outputs are further given to gates N1 and N2 of IC6 to trigger IC7 via npn transistor T1. The time durations for the high outputs of IC1, IC2 and IC3 are preset at 13.5, 9.43 and 2.42 seconds, respectively.

When all the four switches (S7, S16, S14 and S3) are pressed sequentially, timer IC7 triggers to start the motor for the preset period to open the gate. Once the time elapses, the motor stops automatically. The 'on' time for the motor can be selected by adjusting preset VR5. Here, the minimum 'on' time is 5.17 seconds and the maximum 'on' time is 517 seconds.

If a switch other than S7, S16, S14 and S3 is pressed, IC5 triggers to energise relay RL1, which disconnects the power supply of the second relay and the system gets locked and piezobuzzer PZ1 sounds an alarm to alert you that somebody is trying to open the gate lock.

Now to stop the sound and reset the system again press any key (other than S7, S16, S14 and S3) from the keypad.

The circuit works off 6V DC regulated power supply and can be easily assembled on a general-purpose PCB.

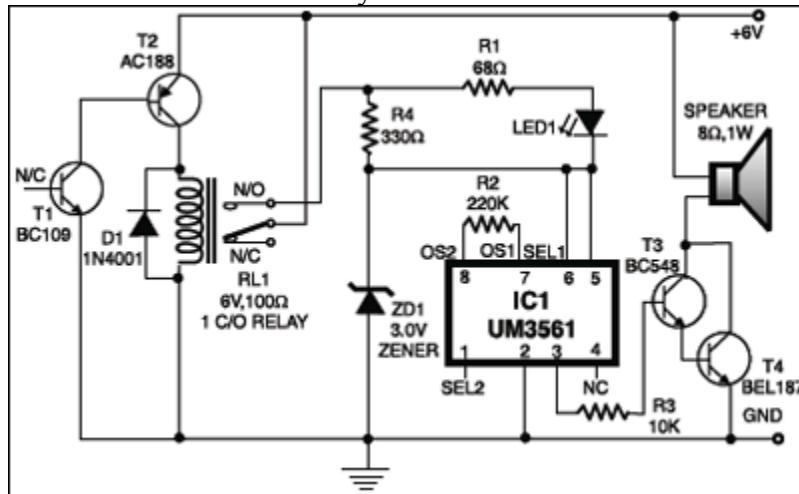


For more detail visit

http://electronicsforu.com/electronicsforu/circuitarchives/view_article.asp?sno=1196&article_type=1&id=1028&tt=unhot

298. AUTOMATIC HEAT DETECTOR

This circuit uses a complementary pair comprising npn metalic transistor T1 (BC109) and pnp germanium transistor T2 (AC188) to detect heat (due to outbreak of fire, etc) in the vicinity and energise a siren. The collector of transistor T1 is connected to the base of transistor T2, while the collector of transistor T2 is connected to relay RL1.



The second part of the circuit comprises popular IC UM3561 (a siren and machine-gun sound generator IC), which can produce the sound of a fire-brigade siren. Pin numbers 5 and 6 of the IC are connected to the +3V supply when the relay is in energised state, whereas pin 2 is grounded.

A resistor (R2) connected across pins 7 and 8 is used to fix the frequency of the inbuilt oscillator. The output is available from pin 3.

Two transistors BC147 (T3) and BEL187 (T4) are connected in Darlington configuration to amplify the sound from UM3561. Resistor R4 in series with a 3V zener is used to provide the 3V supply to UM3561 when the relay is in energised state. LED1, connected in series with 68-ohm resistor R1 across resistor R4, glows when the siren is on.

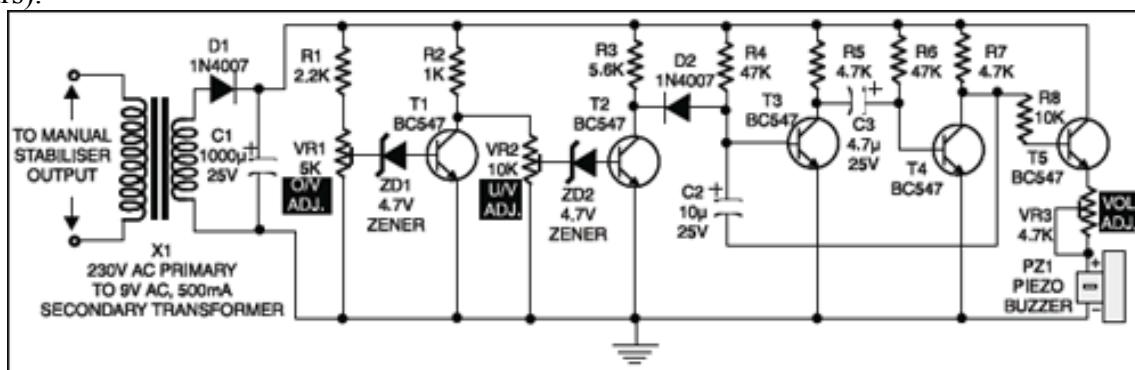
To test the working of the circuit, bring a burning match stick close to transistor T1 (BC109), which causes the resistance of its emitter-collector junction to go low due to a rise in temperature and it starts conducting. Simultaneously, transistor T2 also conducts because its base is connected to the collector of transistor T1. As a result, relay RL1 energises and switches on the siren circuit to produce loud sound of a fire brigade siren.

Lab note. We have added a table to enable readers to obtain all possible sound effects by returning pins 1 and 2 as suggested in the table.

Pin Designation		Sound Effect
SEL1	SEL2	
No Connection	No Connection	Police Siren
+3V	No Connection	Fire Engine Siren
Ground	No Connection	Ambulance Siren
Do not care	+3V	Machine Gun

299. UNDER- /OVER-VOLTAGE BEEP FOR MANUAL STABILISER

Manual stabilisers are still popular because of their simple construction, low cost, and high reliability due to the absence of any relays while covering a wide range of mains AC voltages compared to that handled by automatic voltage stabilisers. These are used mostly in homes and in business centres for loads such as lighting, TV, fridge and in certain areas where the mains AC voltage fluctuates between very low (during peak hours) and abnormally high (during non-peak hours).



Some manual stabilisers available in the market incorporate the high-voltage auto-cut-off facility to turn off the load when the output voltage of manual stabiliser exceeds a certain preset high voltage limit. The output voltage may become high due to the rise in AC mains voltage or due to improper selection by the rotary switch on manual stabiliser.

One of the major disadvantages of using a manual stabiliser in areas with a wide range of voltage fluctuations is that one has to keep a watch on the manual stabiliser's output voltage that is

displayed on a voltmeter and keep changing the same using its rotary switch. Or else, the output voltage may reach the preset auto-cut-off limit to switch off the load without the user's knowledge. To turn on the load again, one has to readjust the stabiliser voltage using its rotary switch. Such operation is very irritating and inconvenient for the user.

This under-/over-voltage audio alarm circuit designed as an add-on circuit for the existing manual stabilisers overcomes the above problem. Whenever the stabiliser's output voltage falls below a preset low-level voltage or rises above a preset high-level voltage, it produces different beep sounds for 'high' and 'low' voltage levels—short-duration beeps with short intervals between successive beeps for 'high' voltage level and slightly longer duration beeps with longer interval between successive beeps for 'low' voltage level. By using these two different types of beep sounds one can readily read just the stabiliser's AC voltage output with the help of the rotary switch. There is no need of frequently checking voltmeter reading.

It is advisable to preset the high-level voltage 10V to 20V less than the required high-voltage limit for auto-cut-off operation. Similarly, for low level one may preset low-level AC voltage 20V to 30V above minimum operating voltage for a given load.

The primary winding terminals of step-down transformer X1 are connected to the output terminals of the manual stabiliser. Thus, 9V DC available across capacitor C1 will vary in accordance with the voltage available at the output terminals of the manual stabiliser, which is used to sense high or low voltage in this circuit.

Transistor T1 in conjunction with zener diode ZD1 and preset VR1 is used to sense and adjust the high-voltage level for beep indication. Similarly, transistor T2 along with zener ZD2 and preset VR2 is used to sense and adjust low voltage level for beep indication.

When the DC voltage across capacitor C1 rises above the preset high-level voltage or falls below the preset low-level voltage, the collector of transistor T2 becomes high due to non-conduction of transistor T2, in either case. However, if the DC voltage sampled across C1 is within the preset high- and low-level voltage, transistor T2 conducts and its collector voltage gets pulled to the ground level. These changes in the collector voltage of transistor T2 are used to start or stop oscillations in the astable multivibrator circuit that is built around transistors T3 and T4. The collector of transistor T4 is connected to the base of buzzer driver transistor T5 through resistor R8. Thus when the collector voltage of transistor T4 goes high, the buzzer sounds. Preset VR3 is used to control the volume of buzzer sound.

In normal condition, the DC voltage sampled across capacitor C1 is within the permissible window voltage zone. The base of transistor T3 is pulled low due to conduction of diode D2 and transistor T2. As a result, capacitor C2 is discharged. The astable multivibrator stops oscillating and transistor T4 starts conducting because transistor T3 is in cut-off state. No beep sound is heard in the buzzer due to conduction of transistor T4 and non-conduction of transistor T5.

When the DC voltage across capacitor C1 goes above or below the window voltage level, transistor T2 is cut off. Its collector voltage goes high and diode D2 stops conducting. Thus there is no discharge path for capacitor C2 through diode D2. The astable multivibrator starts beep is

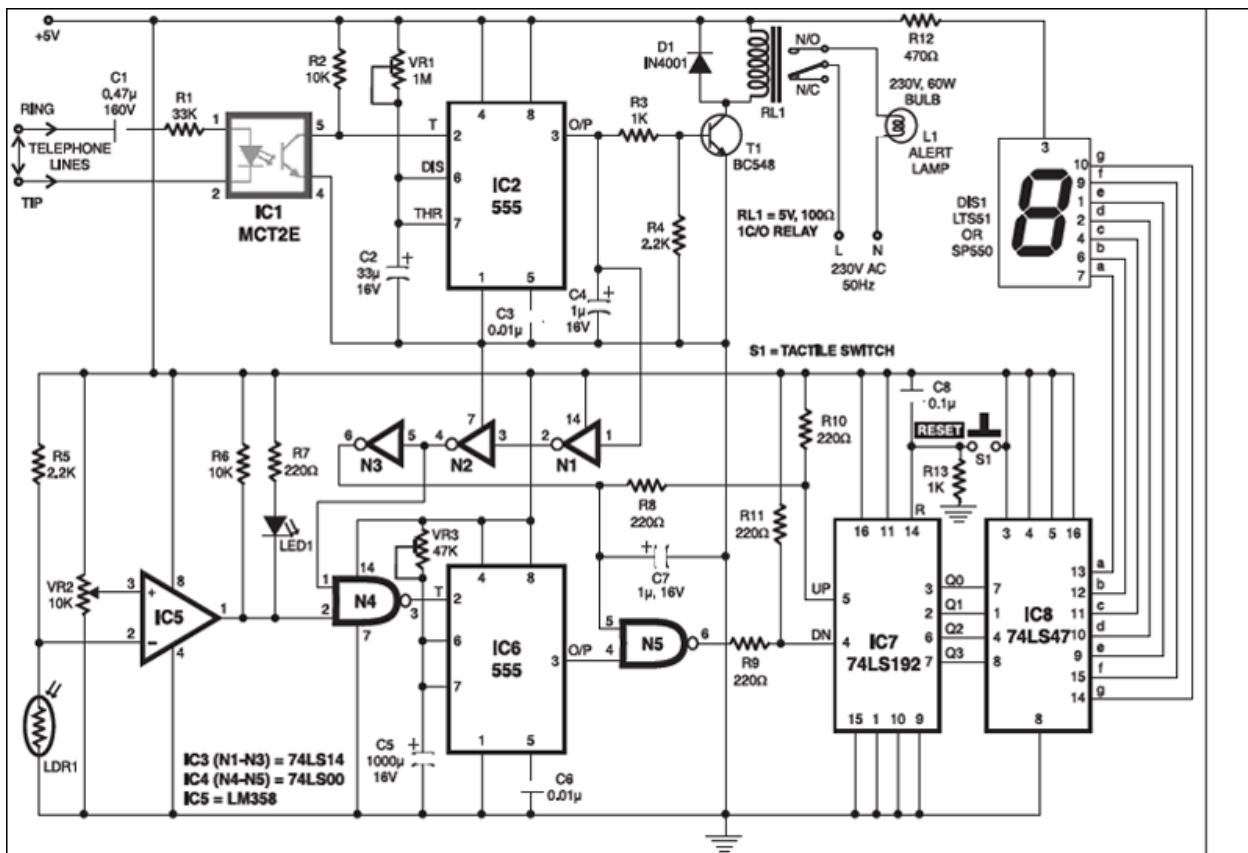
heard and the time interval between two successive beeps are achieved with the help of the DC supply voltage, which is low during low-level voltage sampling and high during high-level voltage sampling. The time taken for charging capacitors C2 and C3 is less when the DC voltage is high and slightly greater when the DC voltage is low for astable multivibrator operation. Thus during low level voltage sensing the buzzer beeps for successive beeps compared to that during high-voltage level sensing.

This circuit can be added to any existing stabiliser (automatic or manual) or UPS to monitor its performance.

300. WATCH MAN WATCHER

Here is a circuit that can be used in offices, stores, warehouses, etc during night to check whether the watchman of your establishment is on duty. For operation, it uses an existing telephone (e.g. in office or store) closest to the watchman's post. The watchman is given an audio alert signal by just ringing the office/store telephone once (minimum) from your residence or any other place, preferably using your mobile phone. The ring is detected by the given circuit and the watchman is also given a visual alert signal by a glowing lamp. The lamp remains 'on' for a duration of nearly 60 seconds soon after the ring tone. The watchman is given an instruction to register his presence by simply pointing his torch-light beam towards a wall-mounted LDR sensor unit (without lifting the handset off-cradle of the ringing telephone). This is to be done within the time period during which the alert lamp glows. If he fails to do it within the permissible time, the circuit registers his absence by incrementing a count. If he does, the count remains unaltered.

Up to nine separate alert rings are considered here. The count displayed is the number of times the watchman failed to register his presence. The mobile phone records the called number and call time, and it can be used with the displayed count to get the timing details.



The telephone lines (TIP and RING) Counter 74LS192 (IC7) is reset to zero state by making its reset pin 14 high through reset switch S1. The 7-segment, common-anode display DIS1 is driven through IC 74LS47 (IC8). When the phone rings, count '1' is displayed after nearly one minute. This happens if the watchman fails to focus the torchlight beam on LDR1.

If LDR1 receives light from the torch of the watchman within the allowed time period, the down clock remains high until the up clock is high. The counter counts up and then down, so, in effect, the count remains unchanged.

All components, except LDR1, are kept in a sealed cabinet with locking arrangement. Only LDR1 is wall-mounted and visible outside. This is done to avoid manual resetting of the counter. The circuit is to be powered by a battery to avoid resetting of the count during power failure. The working procedure can be summarised as follows:

1. Initially, when the power supply is switched on, power-on-reset components C8 and R13 reset counter IC7 and the display shows '0.'
2. Now dial the telephone number (where parallel system is installed) from outside or from your mobile. For the first ring, relay RL1 energises and alert lamp L1 glows.
3. When alert lamp L1 is off, the counter is incremented by '1.'

4. If the watchman focuses the torch-light beam on LDR1 within the glowing time of alert lamp L1, the counter first counts up and then counts down and finally the display shows 0. This indicates that the watchman is present.

5. If the watchman focuses the torch-light beam on LDR1 after alert lamp L1 goes off, up-counting takes place and the display shows '1.' This indicates that the watchman is absent.

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