

PROXIMITY SENSOR SWITCH
CODE 437 **LEVEL 2**

A proximity sensor switch circuit that used as a detective circuit. The circuit working is based on the reflection of an infrared hitting the object and reflecting back to the receiver. This kind of working is well used for checking and detecting approaching objects.

Technical specifications:

- Power supply : 12VDC.
- Consumption : 100mA. max.
- Detecting distance : 5-30 cm. (approx.)
- Time working delay : 0-10 sec.
- Loading : max. 5A./220VAC.
- PCB dimensions : 3.84 x 2.01 in.

How to work:

The circuit is composed of two main parts; a receiver and a transmitter. The transmitter working will start from a frequency generator (TR1 and TR2) that generates frequency of approx. 6kHz. C1, C2, R2 and R3 will limit the generated frequency size. The said frequency then will be passed into TR3 for amplifying before sent out to LED infrared by having VR1 to adjust the output infrared.

When the receiver, through the photo-transistor, gets the frequency from LED infrared, the generated frequency will be amplified by IC2/3 and IC2/4. The amplified frequency then will be sent into IC2/2 that have been connected as a comparative circuit. If the signal level at pin 13 is bigger than at pin 12, IC2/2 will stop sending out voltage through pin 14. VR2 will adjust the comparative level that can also adjust the object detecting distance. When IC2/2 stop sending out voltage, TR4 will work. Voltage from the emitter of TR4 will be sent to the collector of TR4 to light up LED2. Moreover, part of voltage will flow through D1 into C9 and pin 3 of IC2/1. This part of the circuit will act as a working time delay by having VR3 to adjust the working time delay. If the voltage level at pin 3 is bigger than at pin 2 of IC2/1, IC2/1 will send out the voltage to TR5, TR6 and TR7 which have been connected as a flip flop circuit. When jumping J1 to position A, transistors TR6 and TR7 will only work when the object is detected. But when jumping J1 to position B, they will work when object is detected and LED is on and LED will be off when redetecting. Whenever TR1 and TR2 work, relay will also work accordingly.

Circuit assembling:

External connecting and fitting of components are shown in figure 3. It is recommended to assemble the circuit starting with a lower component i.e. diodes, resistor, electrolite capacitors and

transistors etc. Be careful while assembling and check for the matching of PCB poles and components before soldering as shown in Figure 1. Use a max. 40W. solder and soldering lead with a tin and lead ratio of 60/40 together with a joint solution inside. Recheck the assembled circuit for your own assurance. Better using a lead sucker or a lead wire absorber in case of misplacing component to protect PCB damage.

Testing:

Before supplying voltage, jump J1 to position A and head the two sensors to the open space. Then try to adjust VR1 and VR2 to the mid position and VR3 to extremely left. Supply voltage to the circuit and bring hand to the front of both sensors with a clearance of 5 centimeters, relay will work. But when hand has been taken out, relay will immediately stop working.

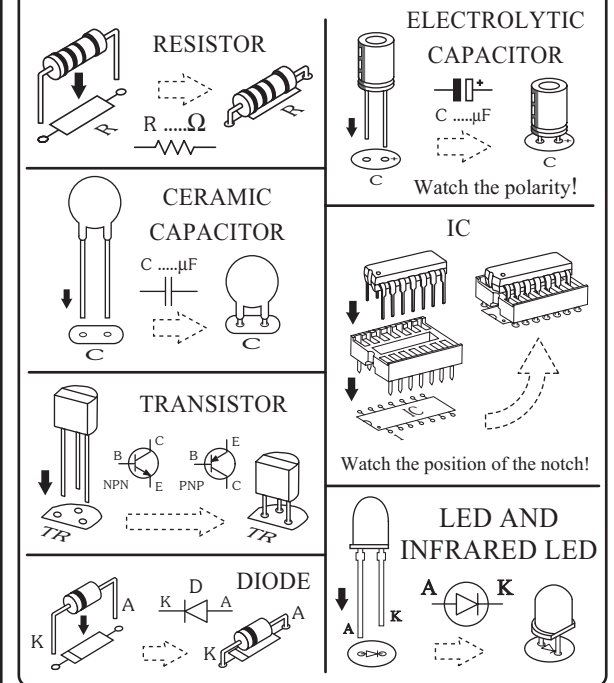
After that, jump J1 to position B and bringing hand to the front of both sensors and taking it out, relay will permanently work. But when redo the same, relay will stop working.

Application:

It is recommended to have a black pipe covered the photo-transistor for preventing any disturbance caused by external light to the photo-transistor.

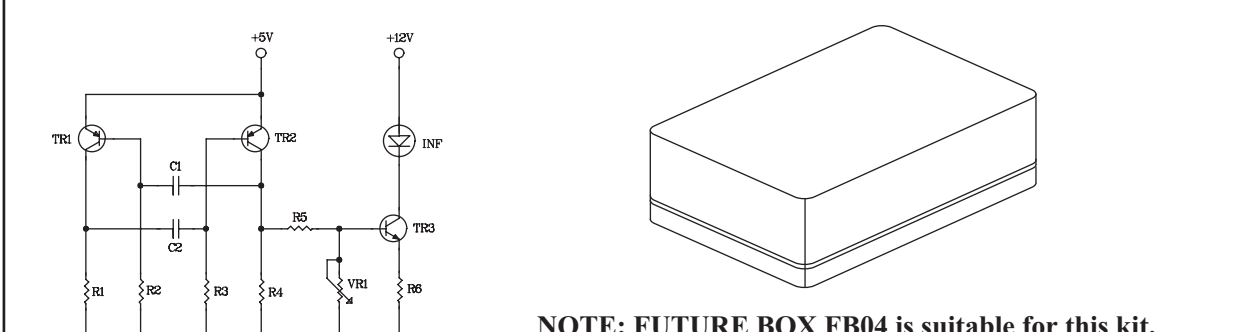
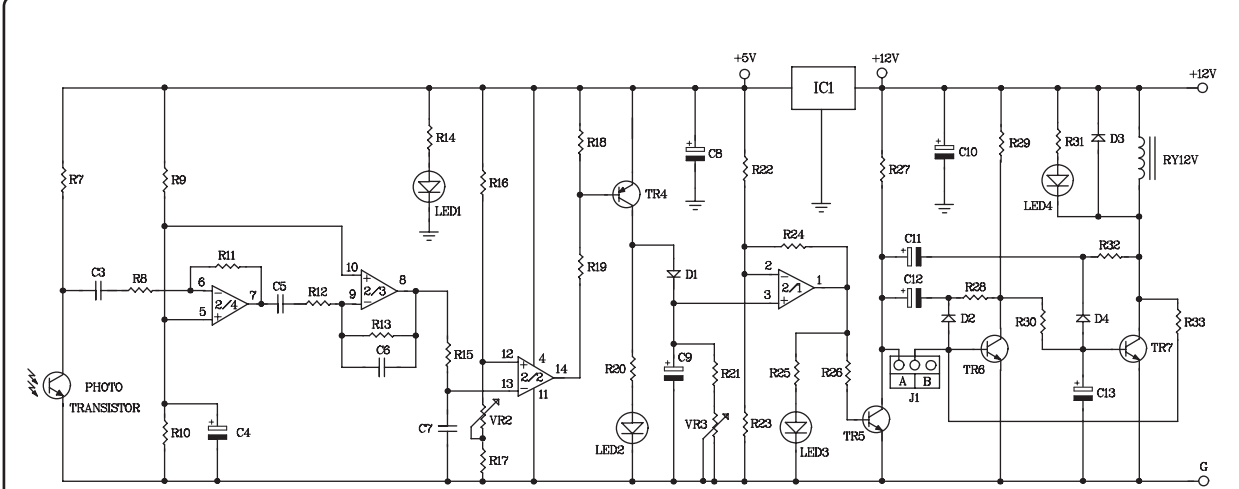
- VR1, used for controlling LED infrared transmission.
- VR2, used for adjust the object detecting distance.
- VR3, used for adjust the circuit working time delay.

Figure 1. Components installing



Troubleshooting:

As the circuit has only a few components, the main cause of troubles will come from component misplacing and defaulted soldering. When found out that the circuit does not work, check for the proper component placings and various soldering points.



NOTE: FUTURE BOX FB04 is suitable for this kit.

Figure 2. Proximity sensor switch circuit

SELECT JUMPER J1 : select operation

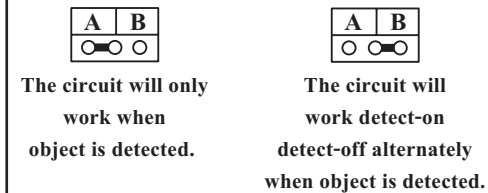
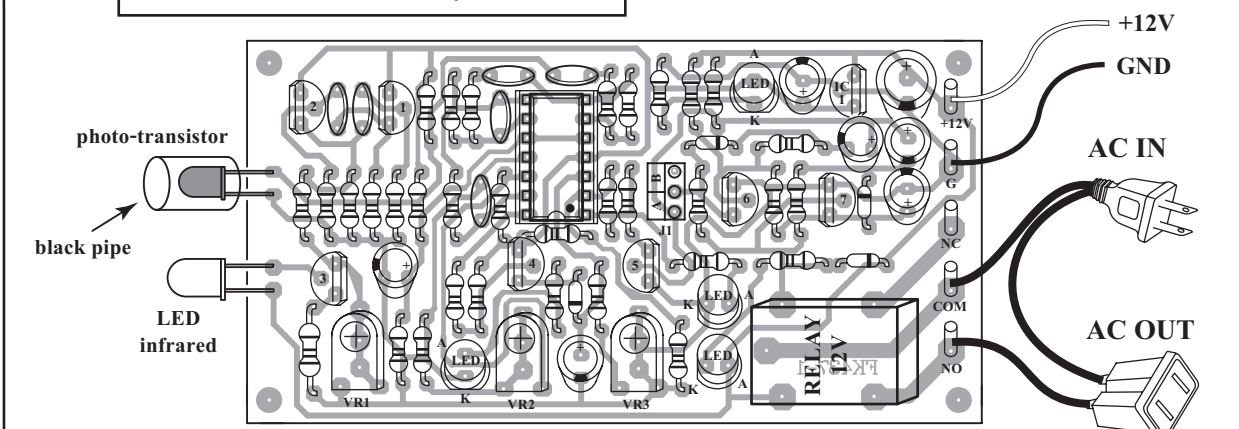


Figure 3. Circuit assembling



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