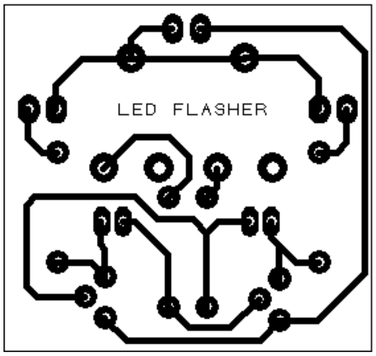
FLASHING LED KIT

Kit Construction
Before you start assembling your kit there are a couple of important things you must do. **FIRST** read through these instructions entirely **before you start construction** then follow the sequence below to ensure your kit is a success.

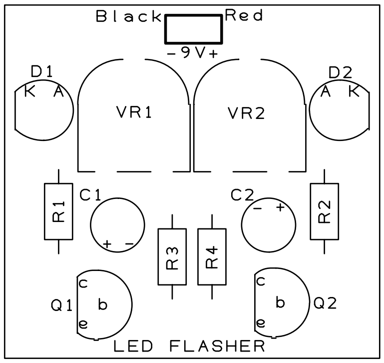
1. First you need to check the components against the parts list below to ensure you have all the components required. If all components are present then move on to step two. If you are missing any components then you will need to contact us for replacements.

   R1, R2 – 1K ohm resistor – Brown, Black, Red (2 of)
   R3, R4 – 10K ohm resistor – Brown, Black, Orange (2 of)
   C1, C2 – 10uF 16V or 25V Electrolytic Capacitor (2 of)
   Q1, Q2 – BC547 Transistor (2 of)
   VR1, VR2 – 200K ohm trimmer potentiometer (2 of)
   1 x 9V Battery Clip
   1 x PCB
   D1,D2 – LEDs (Light Emitting Diodes)

2. You now need to examine the PCB (printed circuit board) to ensure there are no shorted or broken tracks. It should be identical to the PCB Track picture to the right. If the PCB looks OK you may proceed to step 3. If you find any shorted tracks try to remove the short with a small scraper. If there are broken tracks you can repair them by soldering a small piece of wire across the break or contact us for a replacement PCB.



3. Lets start making the kit. Mount the components as shown on the Layout diagram to the right. When mounting the components, bend the leads with a small pair of long nose pliers where required, place component leads through PCB and slightly bend the leads over to hold the components in place. This prevents the components falling out when you turn the PCB over to solder. First mount and solder R1, R2, R3, and R4. Mount the resistors so they sit flat on the PCB. Next mount and solder VR1 and VR2.

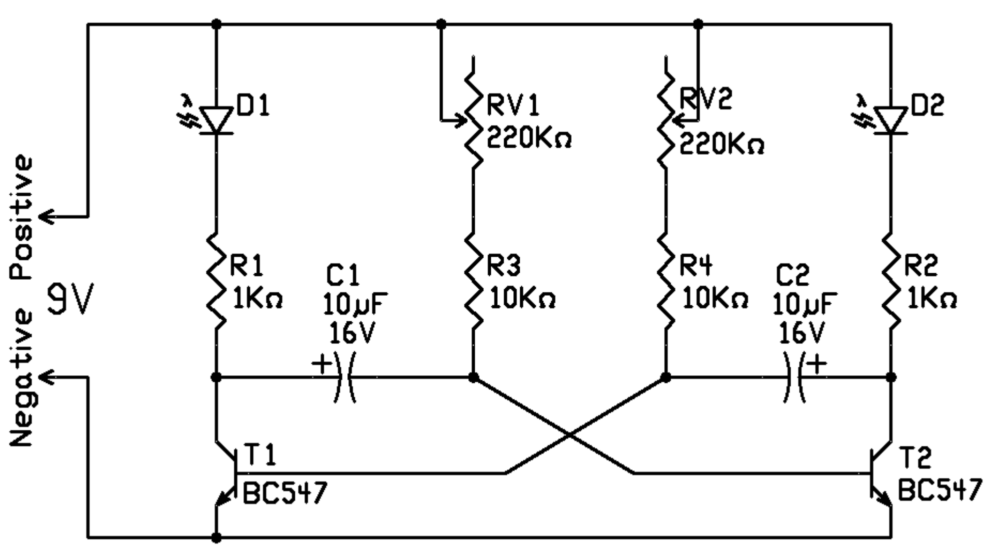


4. Now before you can mount and solder C1, C2, D1, D2, Q1 and Q2 you **must** take notice of the polarity of these components. If they are inserted the wrong way your kit **will not work**. Take extra care with this as it can be a messy job to correct if you make a mistake. First mount the capacitors C1 and C2 with the positive side facing the + mark on the drawing. You will find the negative leads of the capacitors are marked with a row of - - - - down one side pointing to the negative lead. Next mount the LEDs into the positions of D1 and D2. The LEDs have one lead longer than the other and also one flat side at the base of the LED. The longer lead indicates the anode or positive, the short lead and the flat side indicate the cathode or negative of the LED. Insert the LEDs into the board to the height you require. If you are going to mount the flasher into a small box you will

want to mount the LEDs so they extend higher than the other components on the PCB. Ensure that the flat side or short lead of the LED is facing to the outside of the PCB as in the layout drawing.

5. Now you can mount and solder the transistors Q1 and Q2. Ensure you mount them the correct way around as shown in the drawing. When soldering the transistors be careful not to hold the soldering iron on the leads for too long as the transistors can be damaged if they get too hot. Same applies with the LEDs. It is good practice to alternate between several components when soldering to allow the component to cool before soldering another one of its leads. For example, you should mount both transistors then solder one lead on Q1, then one lead on Q2, then another on Q1 etc etc. The final component to solder to the PCB is the 9V battery snap. Take care to get the polarity correct. (Red on + and Black on -)

6. Once you have finished soldering all the components it is time to do a final check before you connect the kit to a battery to see if it works.
First check your PCB against the Layout drawing to confirm all components are in the correct positions and have been orientated the correct way. If any components are incorrect you will need to rectify this before you can continue.
Now take a look at your soldering. Check for any shorts between tracks caused by solder splatters or bridging. Finally double check that you have connected the battery snap the correct way around. Black to negative and Red to positive.
If all looks good then connect a battery and see what happens. Your LEDs should start to flash alternately. CONGRATULATIONS you have completed the kit with success. Well done. If not, recheck all things mentioned above and ensure you have a good battery by testing with another one.
The speed at which the LEDs flash is adjusted by VR1 and VR2. You will require a small screw driver to adjust these potentiometers. Try adjusting these to see what effect they have on the flash rate.



SOLDERING – A Quick Lesson

How important is soldering?

Among the foremost of reasons an electronic project frequently fails to work properly is due to “poor” soldering practices. This is usually caused by “dry joints” when soldering. Here I discuss the correct procedures for soldering electronic projects.

Dry joints when soldering

At first glance many solder joints appear to be quite “O.K.” but on closer examination many are in fact defective. The insidious problem with dry joints in soldering is that the circuit frequently performs alright for a period of time, even years before failure.

This problem even occurs with manufactured equipment. Ask any TV / Video repair technician who has torn a lot of hair out over an elusive fault ultimately traced back to a dry joint.

Good soldering practices for your electronic project

The cause of dry joints in soldering is mostly the improper application of heat. Both the component leg and the PCB need to be both heated simultaneously to the correct temperature to allow the solder to flow freely between BOTH surfaces. Obviously this requires practice and most newcomers inevitably get it wrong.

Improper heating while soldering and its consequences can be seen below.

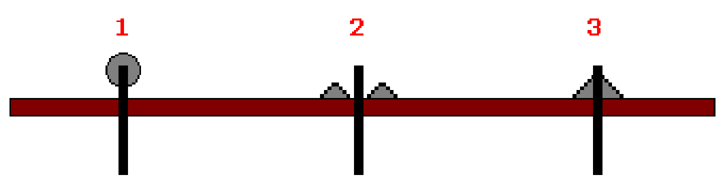


Figure 1 - correct soldering procedures to avoid dry joints

Here in figure 1 entitled “correct soldering procedures to avoid dry joints” we have three examples of soldering depicted. The first example indicates the component lead was heated while the PCB wasn’t heated. As a consequence the solder only flowed onto the component lead.

In the second example of soldering in figure 1 we find the PCB was correctly heated while little or inadequate heat was applied to the component lead. This is the most treacherous example because although I have made it very obvious in the diagram, in practice it is not always particularly obvious. Often this type of dry joint “just” allows the solder to “touch” the component lead while not actually being ***“soldered”*** to the lead. Of course it might work for a period of time depending upon environmental conditions of heat and cold.

In the final example of “correct soldering procedures to avoid dry joints” I have depicted the solder bridging both the PCB and the component lead. In this case the PCB and the component lead were both heated ***“simultaneously”*** AND the solder was applied to either the component lead or the PCB to “flow” freely from one to the other to provide a good "electrical" joint. Such a joint is always "bright and shiny", dull looking joints are often suspect.

You never apply the solder to the soldering iron "tip". Solder is always applied to the "job", never the soldering iron. Allow the solder to "set" and cool before proceeding to the next joint.

Other cases of soldering

We have discussed soldering components to a PCB yet this is not the only case of soldering. Often we need to connect wires to switches and other components. A common misconception is that soldering is designed to provide a good mechanical joint. - It isn't!

Any connection should have it's own mechanical strength perhaps by twisting wires together or twisting the wire around a binding post or through a hole provided for the purpose. The solder is only intended for a good "electrical" connection. Never provide a connection which can't stand mechanically on it's own merits.

What's soldering flux?

Modern quality electronics solders contain a "flux" resin within the solder. This flux is designed to flow over the job and prevent contact with the atmosphere. Metals, particularly copper when heated tend to "oxidise" and prevent the alloying or good electrical bond between the copper and the solder.

Good solder containing the resin will have resin flowing over the leads and prevent this oxidisation process and as the solder flows the resin is displaced allowing the solder to form an "atomic" bonding with the items being soldered together. A good resin helps to keep the surfaces clean.

Rules for good soldering

Of course some of these rules might seem very obvious but are worth repeating.

- Use a reasonable quality iron of the correct wattage for the job.
- Only use "electronic" resin cored solder of fine gauge.
- Make sure all surfaces to be soldered are "bright, shiny" and thoroughly clean.
- If a mechanical joint, make sure it can "stand alone" before soldering.
- Make sure the solder tip is clean, shiny and properly "wetted".
- Apply the resin cored solder to the heated "job", not to the soldering iron tip.
- Remember to visually inspect ALL of your soldered joints, preferably with magnifying glasses.
- Consider using your multimeter to provide an "electrical continuity" check between various parts of the circuit.