

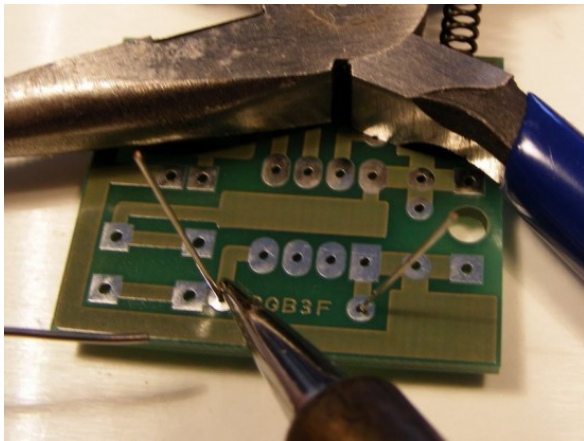


Instructions

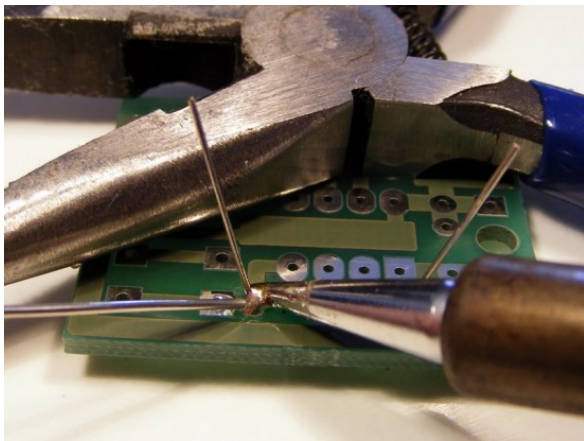
How to Solder

Soldering is easy! Just follow the four simple steps:

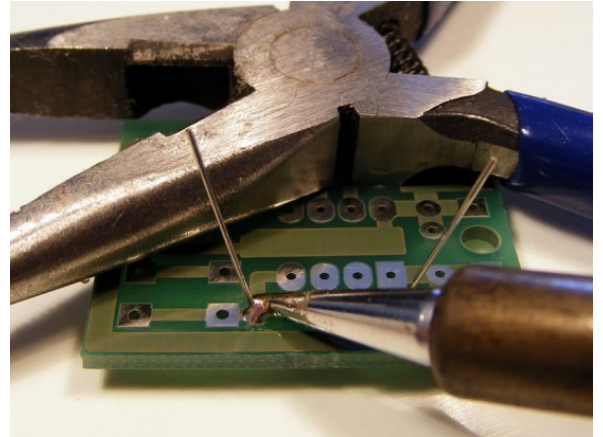
1. Heat both the pad and the component leg for a second or two.



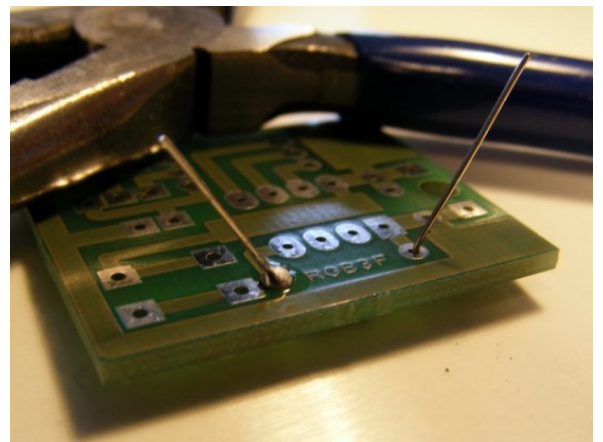
2. Apply Solder - make sure it flows both onto the pad and up the component leg, as here.



3. Stop applying solder - keep the iron on for another second or so.



4. Remove the Iron and you should be left with a perfect joint like this.

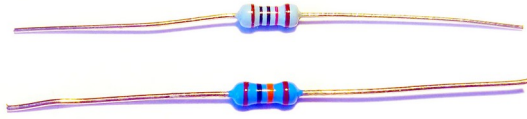


Tips

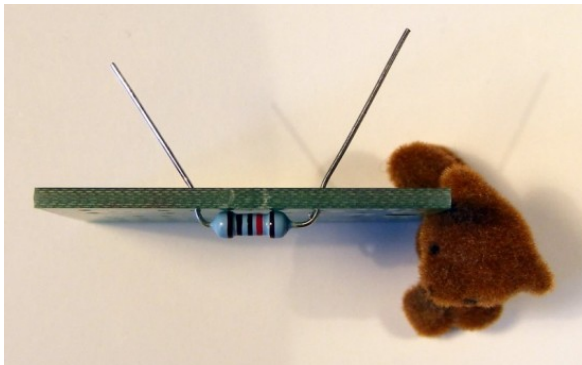
- Keep your tip clean and shiny - wipe it regularly on the brass pad to keep it nice and shiny. But be gentle - don't scrub hard or you'll damage the tip.
- Never put solder on the iron and carry it to the joint. You'll end up with an unreliable connection called a "dry joint". The smoke you see when soldering is from a substance called flux that helps make a good joint. Keep the solder hot for more than a second or two and all the flux boils off.

How to Make a Rainbow

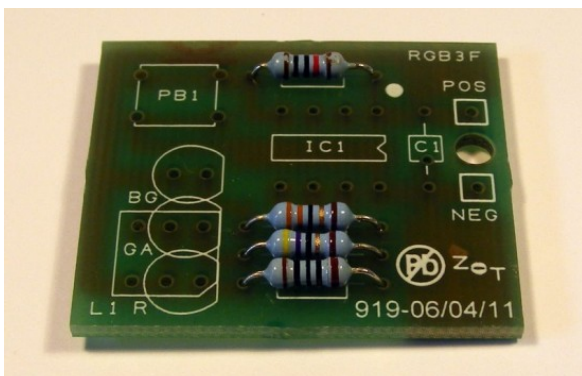
1. Find the 10K resistor: it's usually brown, black, black, red, brown, or sometimes brown black orange brown:



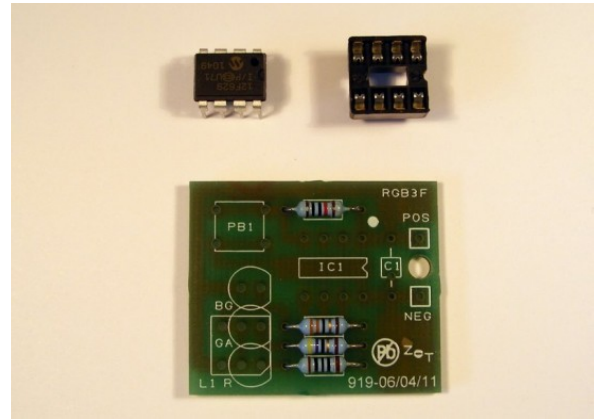
Insert the 10K resistor into the area marked R1. It can go either way round. Bend the legs and push it in until it lies flat against the board. Hold the resistor in place, turn the board over, and bend the legs slightly outwards to hold it in place. Solder both legs, then cut them off as close to the board as you can.



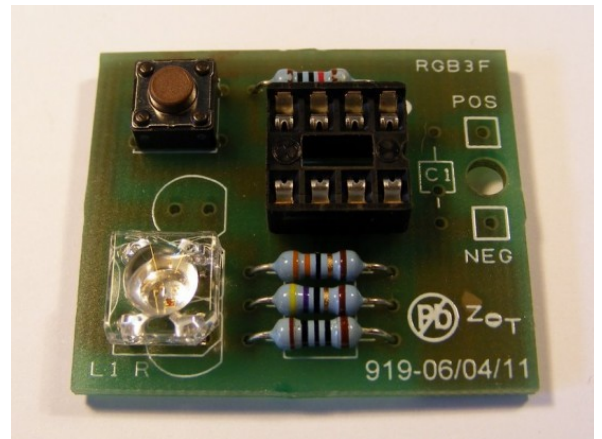
2. R2 is 33R (orange, orange, black, gold, brown), R3 is 47R (yellow, purple, black, gold, brown), R4 is 100R (brown, black, black, black, brown). The resistors can go either way round. Insert and solder one at a time, or all at once if you're confident!



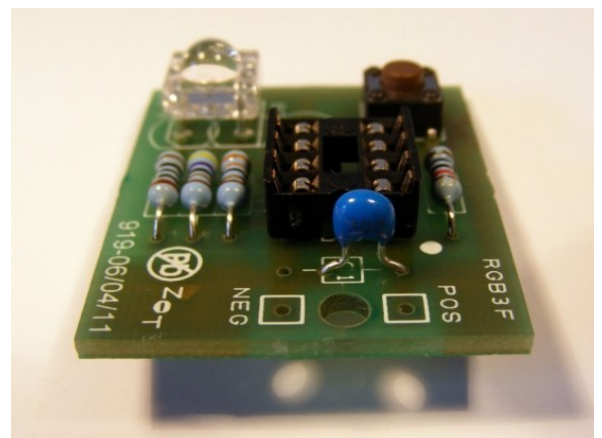
3. Insert the chip socket in the area marked IC1. Don't confuse this with the chip – the chip socket has eight little holes on top that the chip can be pushed into later. The notched end should be at the end marked with a notch on the board. Hold it fully in place and bend over a couple of the legs to hold it securely. Solder all the legs.



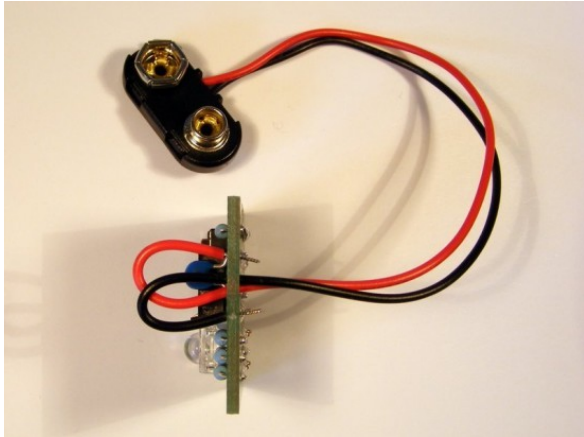
4. The push button goes in the area marked PB1. It will be much easier to insert if you straighten the legs with pliers first. Solder all the legs.
5. The LED goes in the corner marked L1 - the cut-off corner must match the cut-off corner marked on the board. Push it firmly in and solder all the legs.



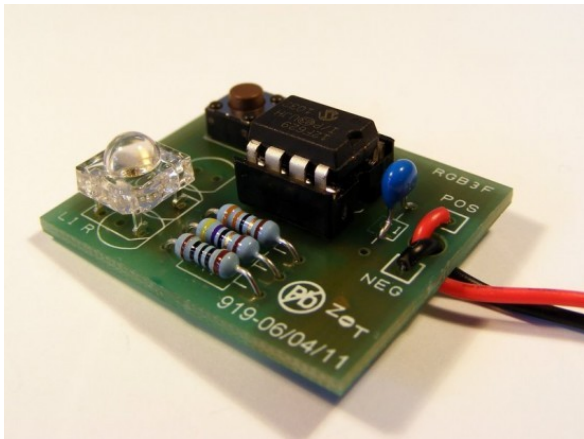
6. The capacitor (marked 104) goes in C1, either way round. There is a choice of two holes for the leg nearer the bottom of the board, depending on the size of capacitor in your kit. Hold it in place and bend the legs outwards, then solder. Cut the legs off as close to the board as you can.



7. The battery lead goes up through the large hole from underneath the board, and then the leads bend over to the small holes, red to POS and black to NEG. Pull the leads tight enough that the ends stay in the holes. Solder the leads (tricky! Try using something heavy to hold the board down) then cut the ends off close to the board and pull the lead tight.



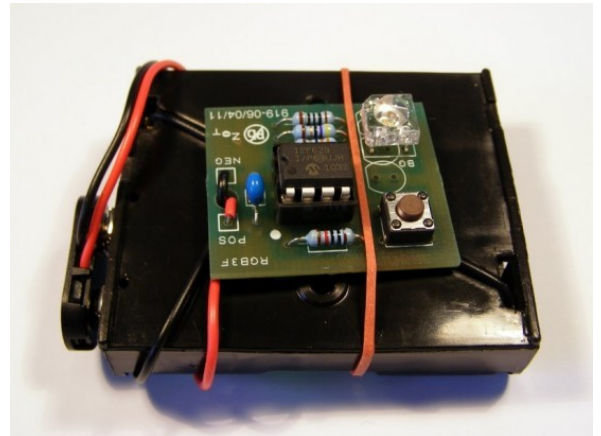
8. The chip pushes into the socket - the notched end MUST be nearest the capacitor.



9. The batteries go in with the flat ends towards the springs - the same as almost all batteries!

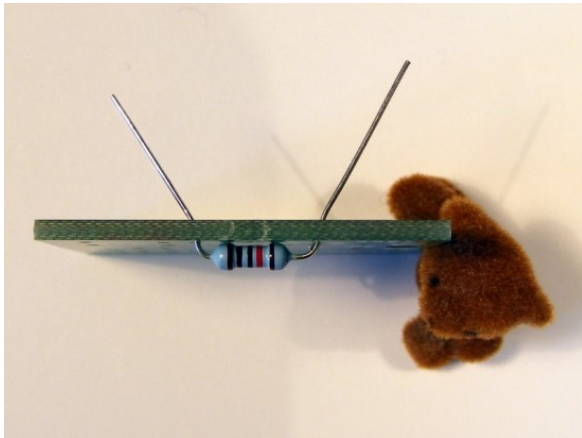


10. You can now attach the board to the battery box using an elastic band - we suggest you use the bottom (plastic) side of the battery box as sometimes the bottom of the circuit can be sharp, cutting through the paint on the batteries and causing short circuits.

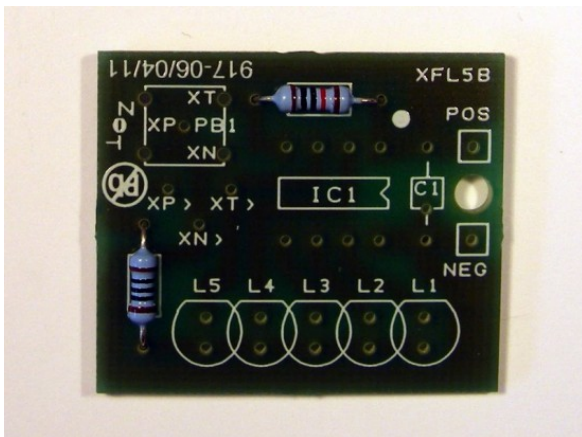


How to Make 5 Flashing Lights

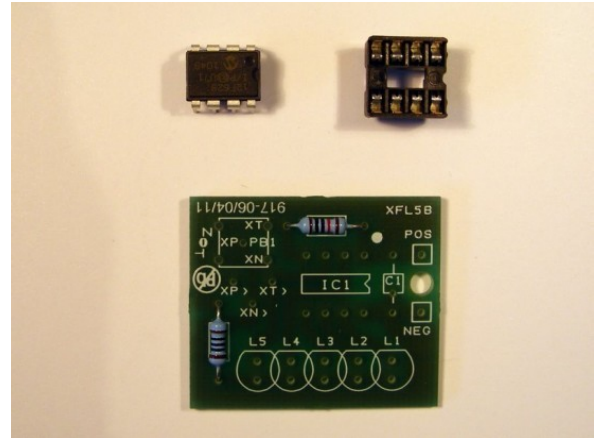
1. Insert the 10K resistor (brown, black, black, red, brown) into the area marked R1. It can go either way round. Bend the legs and push it in until it lies flat against the board. Hold the resistor in place, turn the board over, and bend the legs slightly outwards to hold it in place. Solder both legs, then cut them off as close to the board as you can.



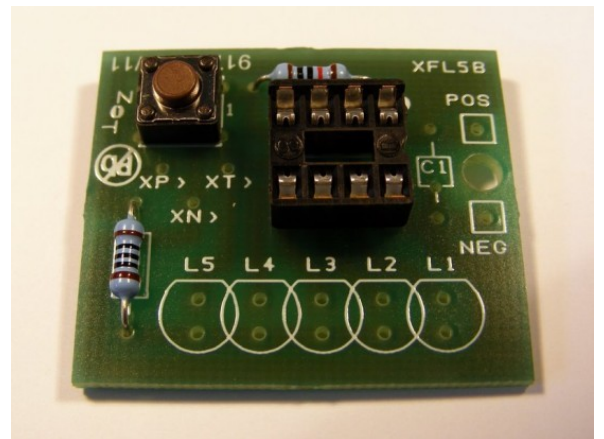
2. R2 is the 100R resistor (brown, black, black, black, brown). It can go either way round. Insert and solder as for the first resistor.



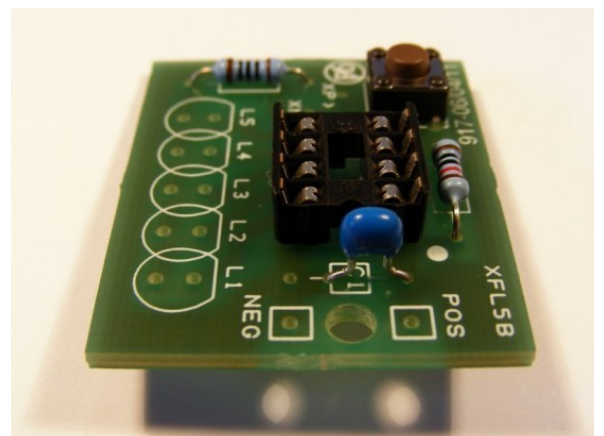
3. Insert the chip socket in the area marked IC1. Don't confuse this with the chip – the chip socket has eight little holes on top that the chip can be pushed into later. The notched end should be at the end marked with a notch on the board. Hold it fully in place and bend over a couple of the legs to hold it securely. Solder all the legs.



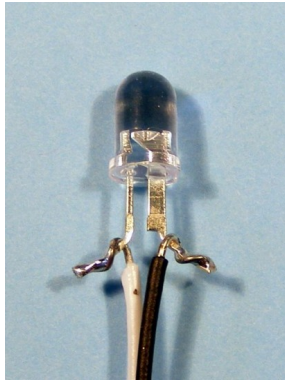
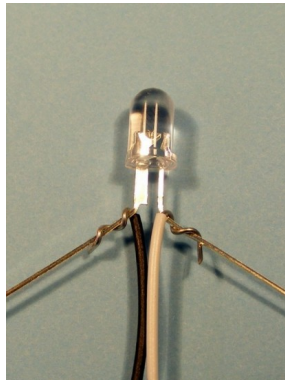
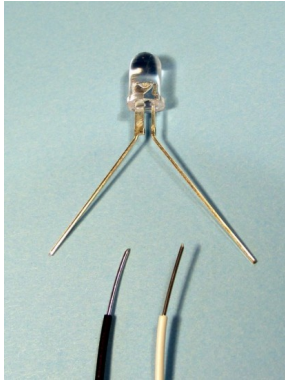
4. The push button goes in the area marked PB1. It will be much easier to insert if you straighten the legs with pliers first. Solder all the legs.



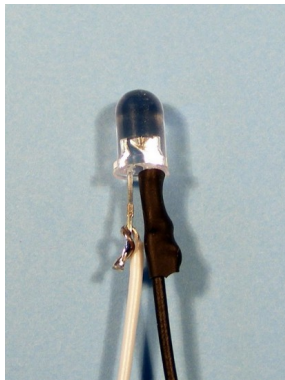
5. The capacitor (marked 104) goes in C1, either way round. There is a choice of two holes for the leg nearer the bottom of the board, depending on the size of capacitor in your kit. Hold it in place and bend the legs outwards, then solder. Cut the legs off as close to the board as you can.



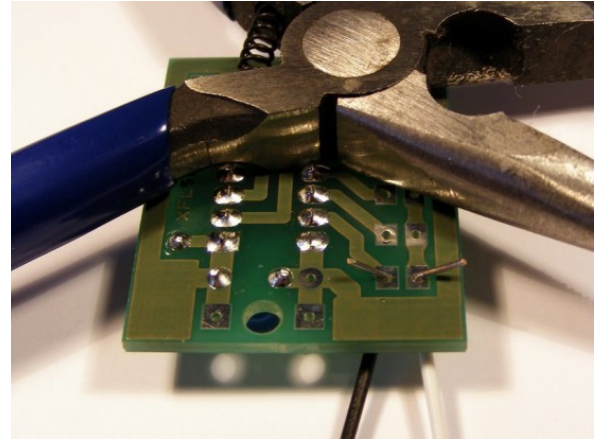
6. You will find a red, orange, yellow, green and blue LED in your kit (assorted red, yellow and green in 2010 edition kits). Strip about 1cm from each end of five lengths of white wire and five lengths of black wire. Splay the legs on the LEDs and twist the wire round each - we recommend black for negative (flat side on LED body) and white for positive. Solder the joins.



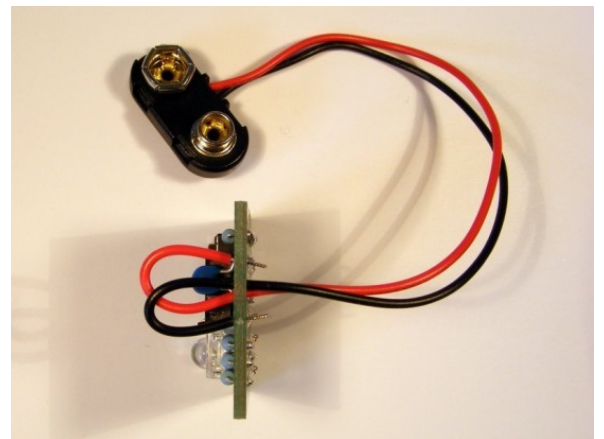
7. Cut the length of heatshrink tubing into five pieces. Heatshrink was not provided in 2010 edition kits - you can use sticky tape instead. Place a piece over the negative (black) wire of each LED and push right up against the LED. Shrink the tubing by holding it as near to the soldering iron as you can without touching it - about half an inch up from the tip works best. If you do touch the heatshrink with the iron, wipe off any molten plastic as soon as possible on the brass tip cleaner.



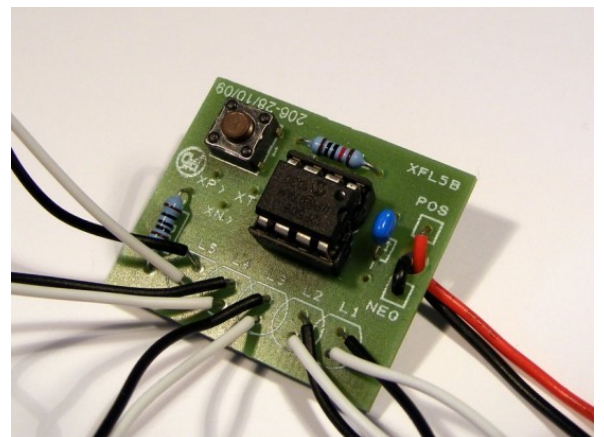
8. Push the LED wires into the board, one LED at a time. The negative (black) wires MUST go to the flattened side of the circles marked on the board. Bend the wires over to hold in place. Solder the wires (tricky! Try using something heavy to hold the board down) then cut the ends off close to the board.



9. The battery lead goes up through the large hole from underneath the board, and then the leads bend over to the small holes, red to POS and black to NEG. Pull the leads tight enough that the ends stay in the holes. Solder the leads then cut the ends off close to the board and pull the lead tight.



10. The chip pushes into the socket - the notched end MUST be nearest the capacitor.

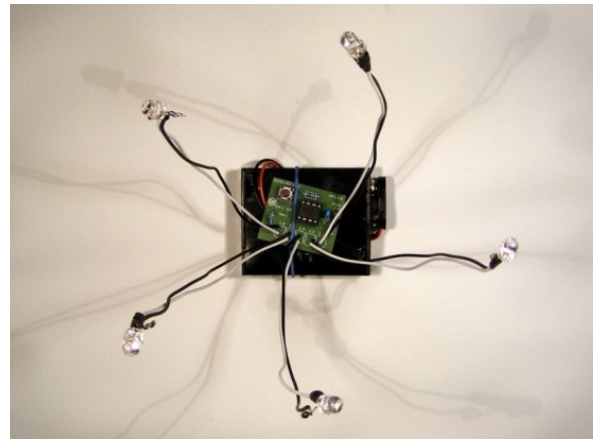


11. The batteries go in with the flat ends towards the springs - the same as almost all batteries!



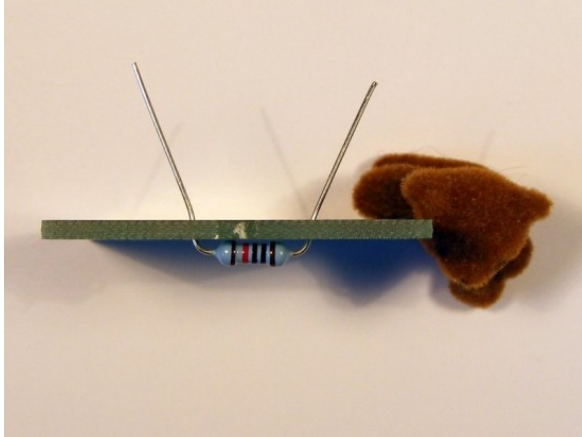
12. You can now attach the board to the battery box using an elastic band - we suggest you

use the bottom (plastic) side of the battery box as sometimes the bottom of the circuit can be sharp, cutting through the paint on the batteries and causing short circuits.

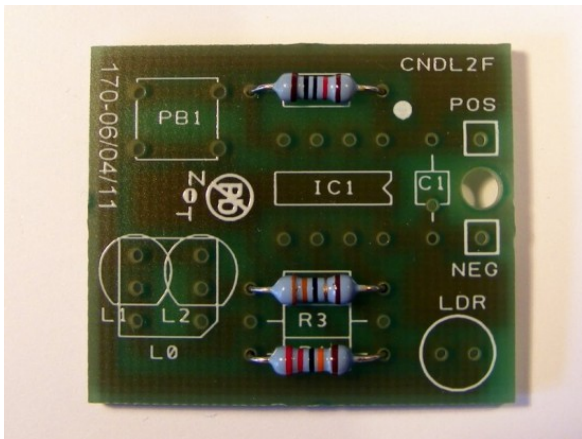


How to Make a Magic Candle

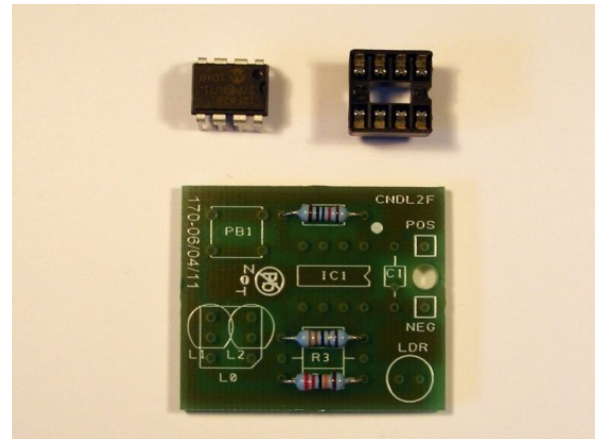
1. Insert the 10K resistor (brown, black, black, red, brown) into the area marked R1. It can go either way round. Bend the legs and push it in until it lies flat against the board. Hold the resistor in place, turn the board over, and bend the legs slightly outwards to hold it in place. Solder both legs, then cut them off as close to the board as you can.



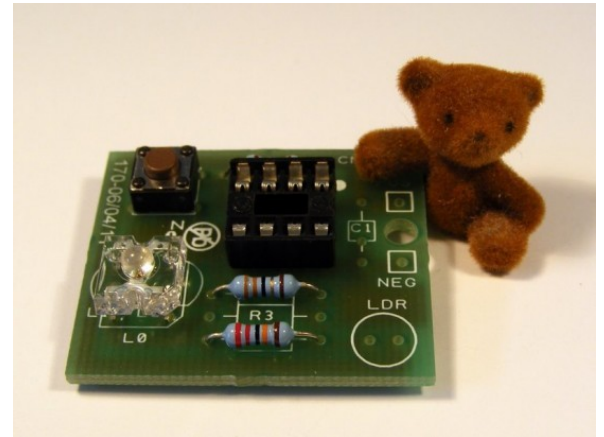
2. R2 is 33R (orange, orange, black, gold, brown), R4 is 220K (red, red, black, orange, brown). R4 is not present in 2010 edition candles. The resistors can go either way round. Insert and solder as for R1.



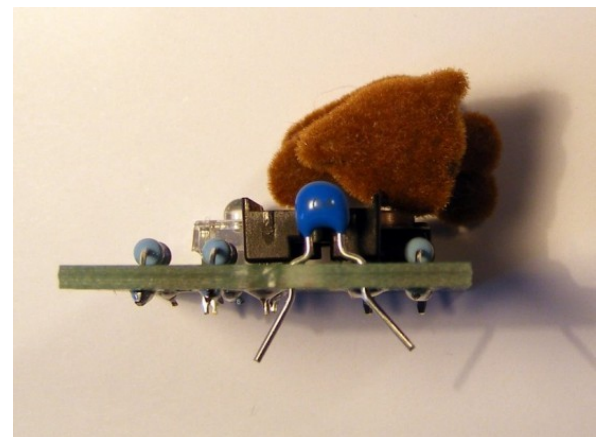
3. Insert the chip socket in the area marked IC1. Don't confuse this with the chip – the chip socket has eight little holes on top that the chip can be pushed into later. The notched end should be at the end marked with a notch on the board. Hold it fully in place and bend over a couple of the legs to hold it securely. Solder all the legs.



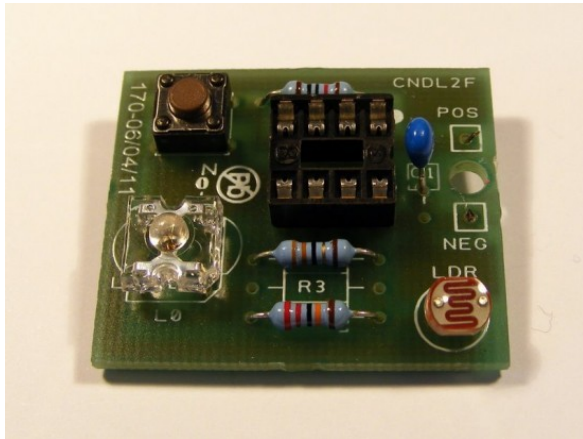
4. The push button goes in the area marked PB1. It will be much easier to insert if you straighten the legs with pliers first. Solder all the legs.
5. The LED goes in the corner marked L0 - the cut-off corner must match the cut-off corner marked on the board. Push it firmly in and solder all the legs.



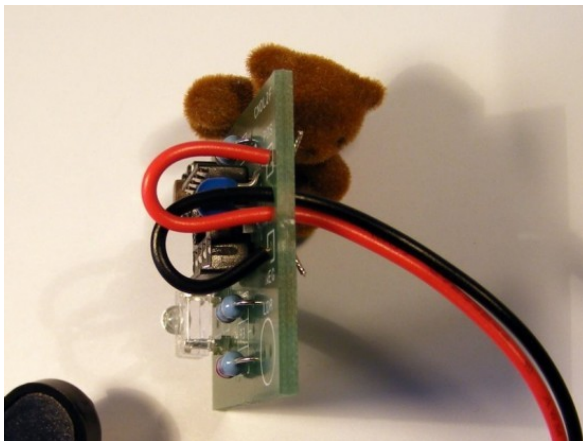
6. The capacitor (marked 104) goes in C1, either way round. There is a choice of two holes for the leg nearer the bottom of the board, depending on the size of capacitor in your kit. Hold it in place and bend the legs outwards, then solder. Cut the legs off as close to the board as you can.



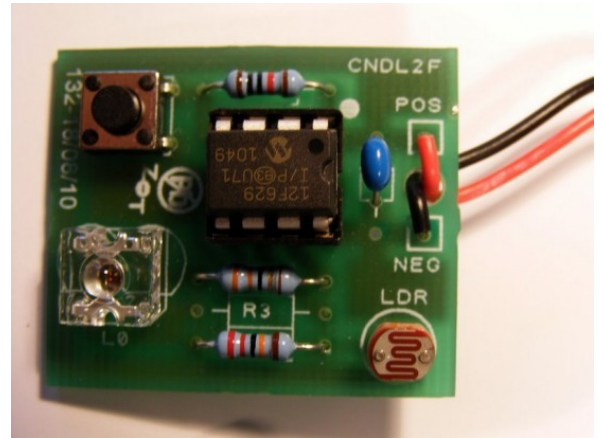
7. The Light Dependent Resistor (LDR) goes in the hole marked LDR. 2010 edition candles don't have an LDR.



8. The battery lead goes up through the large hole from underneath the board, and then the leads bend over to the small holes, red to POS and black to NEG. Pull the leads tight enough that the ends stay in the holes. Solder the leads (tricky! Try using something heavy to hold the board down) then cut the ends off close to the board and pull the lead tight.



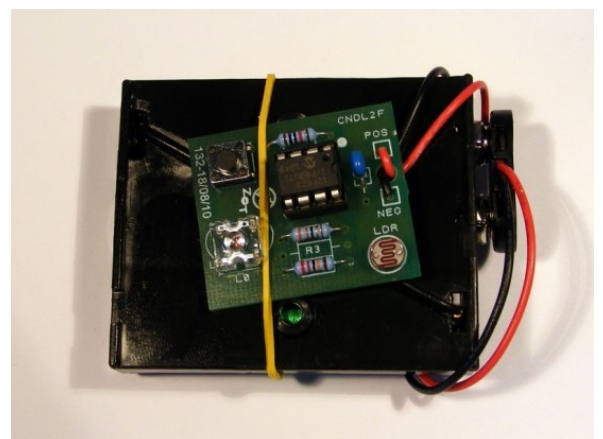
9. The chip pushes into the socket - the notched end MUST be nearest the capacitor.



10. The batteries go in with the flat ends towards the springs - the same as almost all batteries!



11. You can now attach the board to the battery box using an elastic band - we suggest you use the bottom (plastic) side of the battery box as sometimes the bottom of the circuit can be sharp, cutting through the paint on the batteries and causing short circuits.



Tips

- Try using a polystyrene packing bead or a triangle of polystyrene packing wrap as a flame-shaped diffuser.