Build your own Electronic Microcontroller Roulette Wheel Game Kit

This superb, unique, and high quality electronic kit comes with all components and preprogrammed microcontroller containing the Roulette Wheel game software.

The kit is ideal for advancing your knowledge of electronics, and is a useful and fun project you can be proud to show as something you built.

There are 18 red LEDs, 18 blue LEDs and one green LED around the outside of the 100mm diameter wheel which show the spin of the ball as it passes over the numbered pocket LEDs. The digital display in the middle also shows which pocket the ball is currently passing.

When you press the "**Spin!**" button, the ball-LED travels fast around the outside pockets then gradually slows down, eventually stopping on one of the pocket LEDs, and the digital display flashes to show the result.

Comes complete with power connecting wires, switch, and a PP3 9V battery connector (battery not included).

This kit requires ***good soldering skills*** and is intended for the ***experienced*** hobbyist constructor.

Please read through all of these instructions before starting construction of your project.

The kit must be used only for the purposes of fun and amusement. Totally random scores can't be guaranteed.

Electronics, PCB and software all designed in the UK by ***The Electronics Kit Shop***.

The Electronics Kit Shop

https://www.electronicskitshop.com
info@electronicskitshop.com

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General Project Information

	**CHOKING HAZARD** Contains small parts, not suitable for small children. If children might use the finished project they must be supervised at all times.
	**Persons with Photosensitivity** Contains flashing lights

Required Skills

The project requires the basic ability to solder and to follow assembly instructions.

Assembly of the project must be carried out by a competent adult or person under adult supervision.

Intended Use

The project is for educational or home domestic hobby environments for fun and amusement. The project is not for use in or near industrial, safety-related, medical devices, automotive or aviation.

Environmental

The finished project is intended for a clean, dry environment. Don't expose the project to direct sunlight and sources of ultraviolet light (UV).

	The project and associated waste must be disposed of in an environmentally friendly manner at a designated facility, and not be disposed of in household waste.

Power Supply

The project is intended to be supplied from a 9V PP3 battery. Excessive voltage or unstable supplies can damage components or pose a heat or combustion hazard. Never exceed 16V supply.

Electrostatic Discharge

Some components are sensitive to static electricity "electrostatic discharge" (ESD), which can damage or destroy them. Is recommended that you ground yourself by wearing an anti-static wrist strap connected to a grounded surface or by safely touching a grounded surface when handling these components.

Use of an anti-static work mat is recommended.

Working Practices

Do not work on the project when it is connected to a power source.

Follow the instructions for assembling the project and ensure that all components are fitted as specified. Some components such as electrolytic capacitors can be a heat or combustion hazard if not fitted correctly.

Work in a well-ventilated area and observe all soldering safety precautions while assembling your project.

Avoid touching hot components.

Wear personal protective equipment for example gloves and eye protection where necessary.

Do not use bleaches, harsh cleaning agents, or solvents on your project or immerse your project in fluids.

Some projects contain bright LEDs; avoid looking directly into the LEDs when illuminated.

Ensure nothing conductive can touch the components or PCB while the project is in use.

Immediately disconnect the project from the power source if there are any signs of heat, odours, smoke, or discoloration of components or the PCB.

Meaning of Symbols in these Instructions

	Take care when fitting or your project **won't work**
	**MUST be fitted as stated.** May pose a **hazard** if not fitted correctly

General Procedure for Building Projects

Fit the least accessible parts first

In some projects, some of the parts are surrounded by other parts, so they need to be fitted before the surrounding parts. In your roulette project all components are easily accessible.

Fit parts in order of their height

It is often easiest to fit the lowest height parts first, so when you place the PCB face-down on the worksurface, the parts rest directly on the worksurface and don't fall out. Fit the components with gradually increasing heights. In your roulette project we'll generally do this.

Fit the most sensitive components last

Components that are sensitive to heat, static electricity, or can be damaged by assembly should be fitted last, for example the microcontroller.

Please be aware

Almost all components can be damaged by heat. They can be melted visibly externally or they can be damaged invisibly internally – so they look OK but actually are melted inside. When soldering only use as much heat and solder as is needed to hold the component and give a good electrical contact. Too much heat almost always damages components.

Before applying power

It is always best to check for faults before applying power, and especially before fitting the microcontroller into its socket. See later in this document for a suggested test procedure.

When Building your Project

You must work with caution and observe all safety procedures.

Using your Project

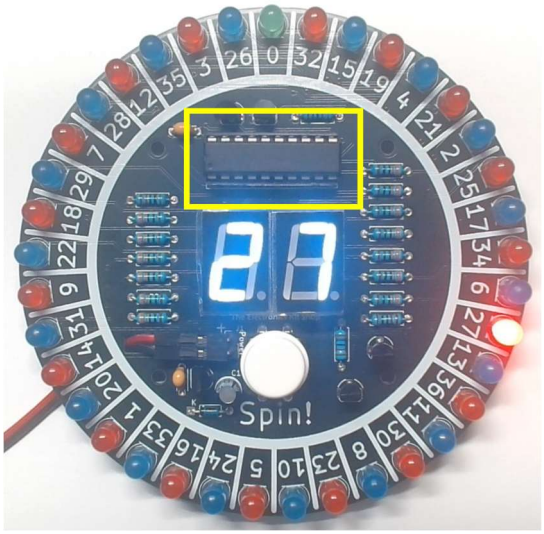
Please note that this project:

- Contains **flashing lights**
- Is **not suitable for small children** due to small parts
- Must be used only for the purposes of fun and amusement
- Is for occasional indoor UK home domestic use and is not for use near sensitive electronic or medical equipment.
- Must be protected from extremes of temperature, rain and moisture

And for the environment - always dispose of electrical waste in the proper facilities.

Learn about your Project

The Microcontroller



The microcontroller is the heart of your project. It is a very small self-contained computer with its own in-built memory and which runs its own software. It's just like your PC, laptop, tablet or mobile phone – but many times smaller and simpler, and with limited capabilities.

There are many different types and sizes of microcontroller. The microcontroller in your project is called the PIC16F15244 and is manufactured by Microchip Inc of the USA.

What does the Microcontroller do in my Project?

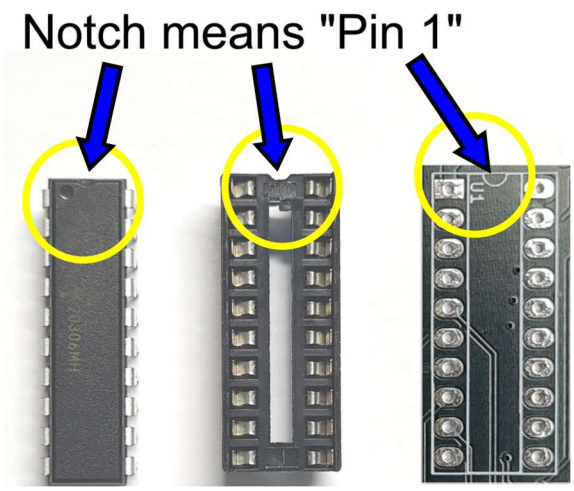
The microcontroller's job is to read the Spin button input, and to activate the 37 LED outputs and two 7-Segment displays. There is no direct electrical connection between the Spin input and the LED & display outputs. The microcontroller decides what to do with the LED & display outputs according to how it has been programmed with its "Software". The Software is just like an "App" on your mobile phone which tells your phone how to react to your touches and to display things.

What do I have to be aware of with the Microcontroller?

The microcontroller has metal pins around the outside which connect it to the project circuit. The pins are numbered starting at **Pin 1** at the top left of the microcontroller body, and are numbered clockwise downwards on the left, then upwards on the right of the body.

The microcontroller must be fitted the correct way around, else its pins would not go to the correct places in the circuit. It is important to know where **Pin 1** is. If plugged in the wrong way around, it could be destroyed.

Because it is possible to damage microcontrollers by heat, for example by soldering, the microcontroller in this project also has a socket to plug it into. The socket is soldered to the PCB first, then the microcontroller can be fitted last of all. It is best to do some testing of the PCB before fitting the microcontroller – see later in this document.



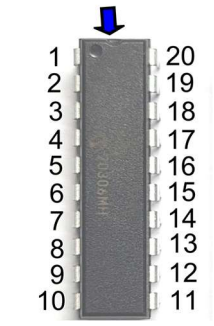
You can tell which way around to fit the microcontroller and socket by locating a **Notch** which tells you where **Pin 1** is.

The notch in the socket aligns with the notch in the printing on the PCB.

The notch (and little dot) on the microcontroller tells you where **Pin 1** is, and this aligns with the socket and PCB.

Microcontrollers can also be damaged by static electricity. The microcontroller is supplied in your kit plugged into some static safe foam and contained inside a static safe bag. If you have an "Earthing Wrist Strap" you should use that when handling static sensitive devices such as the microcontroller. If you don't have an Earthing Wrist Strap, it is worthwhile getting one, or safely touch something 'electrically grounded' while handling static sensitive devices.

What do the Microcontroller Pins Do?



The Microcontroller in this project has 20 pins.

Two of the pins supply power to the microcontroller.

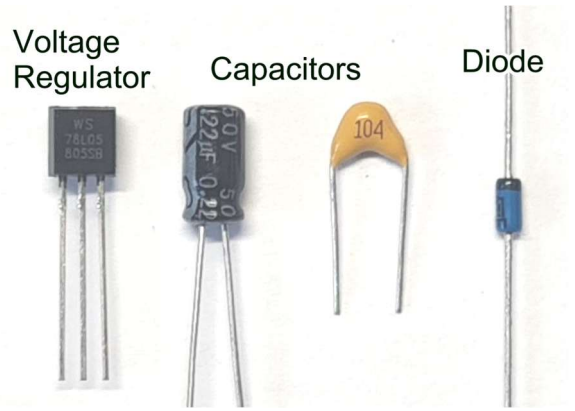
The microcontroller has one 'input' pin which detects when you press the Spin button.

It also has 17 'output' pins which drive the displays and LEDs.

The software inside the microcontroller tells it to read the Spin button, how to simulate the spin of the roulette wheel, and what to show on the display and LED outputs.

The Power Supply

The microcontroller can only be supplied with 5 Volts or less; greater than 5V would destroy the microcontroller. So we have a little Power Supply in the circuit that reduces the input voltage down to the 5V that the microcontroller needs.



Voltage Regulator: reduces whatever the input supply voltage is down to 5 Volts. So if you supply your project with a 9 Volt battery, the voltage regulator reduces that 9V down to 5V. You have to fit the voltage regulator the correct way around.

Capacitors: these store electricity like a standby fuel tank. When the displays and LEDs switch on, they can take a sudden chunk of power which can disturb the 5V supply. In these cases the capacitors give a little of what they have stored in them to keep the power supply stable. One of the capacitors (the black one) has to be fitted the correct way around.

Diode: only allows electricity to pass one way through it. If you connected the power supply battery the wrong way around, the circuit could be destroyed. But with the diode in there, it only allows the electricity to pass in the correct direction, so protecting the circuit from wrong power supply connections. You have to fit diodes the correct way around.

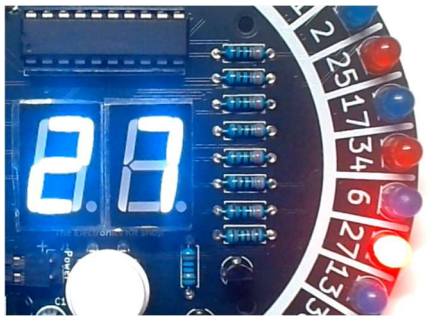
The Inputs and Outputs

All electronic projects have:

- At least one outputs
- no inputs, or one, or more than one

Look at any electronic device and you'll see that it has at least one output and often has inputs. Your mobile phone outputs are the visible screen and the speakers. Its inputs are the touchscreen and the side buttons.

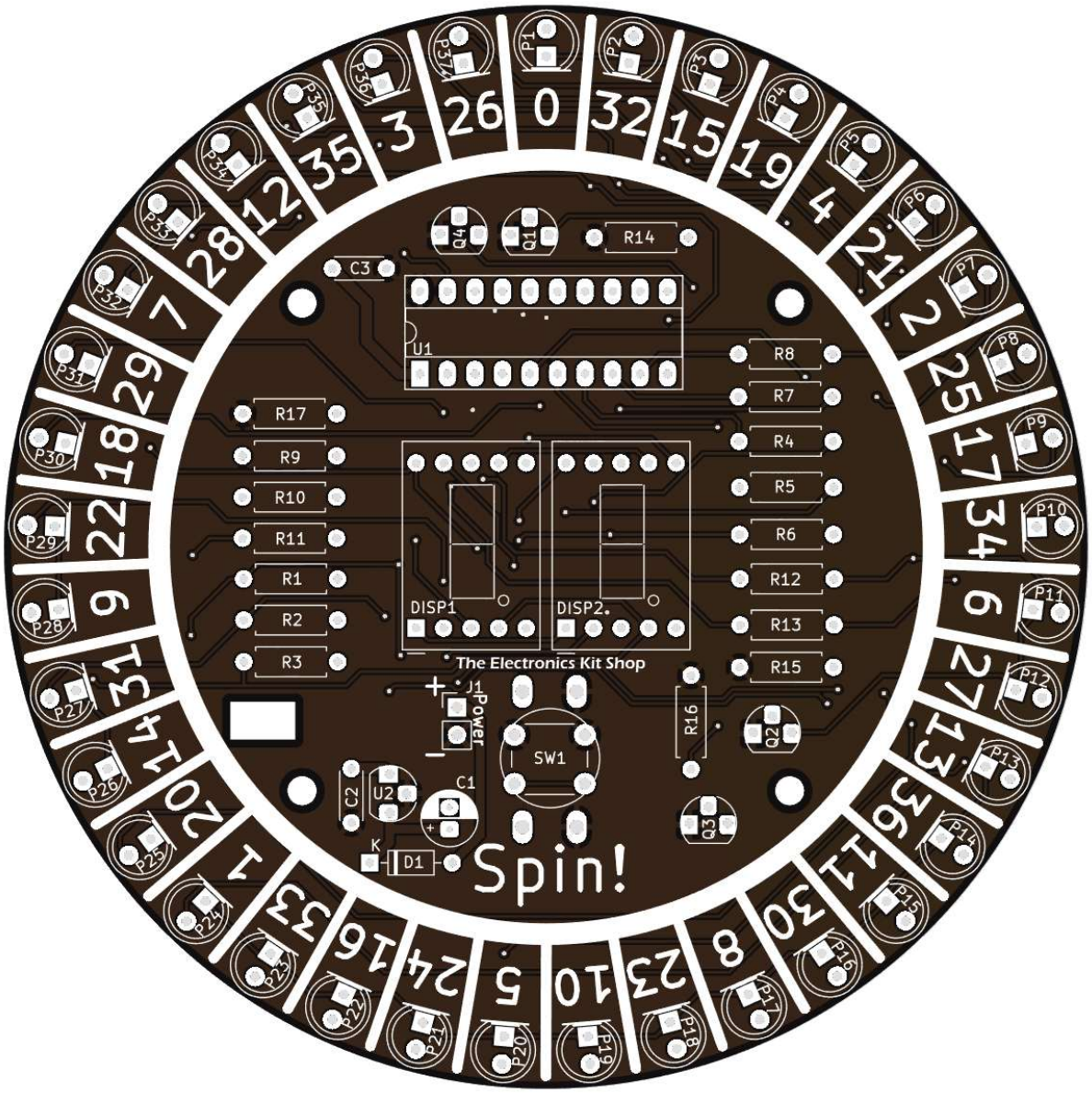
Your roulette project has one input and 39 outputs.

	Your roulette **input** is the pushbutton for spinning the wheel. The pushbutton is wired to a microcontroller input so the microcontroller can detect when you press this button, and the software then simulates the spin of the wheel on the LEDs and the digital displays. This type of input is called a “Digital” input. The button can either be pressed on or not pressed; there’s no “half pressed”.
	Your roulette **outputs** are the 37 LEDs and two digital displays that show the wheel’s spinning ‘ball’ position. All of the LEDs and displays are wired to the microcontroller outputs, such that the microcontroller can control the LEDs individually and can create the digital numbers.

PCB Component Placement

The PCB has printing on it to show you where the components are fitted. The letters and numbers on the PCB are “Component References” to tell you which components go into that place on the PCB.

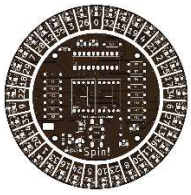
All components are fitted from the front of the PCB and soldered on the back.



Components List

Some components in your kit may come in separate little packages, for example those for the power supply, and those for the Battery Connections.

Qty	Reference(s)		Value	Function
1		C1	Electrolytic capacitor 0.47uF or 20uF	Power supply (PSU) smoothing
2		C2, C3	Ceramic capacitor 100nF (marked '104')	PSU smoothing
1		D1	Diode BAT48	Reverse supply protection
37		P1 thru P37	5mm LED: 1 Green 18 Red 18 Blue	"Ball" display around the outside of the wheel
2		DISP1, DISP2	7-Segment Displays	Displaying the score
1		J1	Connector, 2.54mm spacing, 2 pins, right-angled	Power supply input connection
13		R1 thru R13	Resistor 330R ohms	LED current limiting
4		R14 thru R17	Resistor 10K ohms	Keeps transistors off while the microcontroller is starting up

1		SW1	12mm Pushbutton and Cap (colours vary)	Spin! button
1		U1	Microcontroller PIC16F15244	Controls your project
1		U2	Voltage regulator 78L05 or 805Z	5V power supply regulator
4		Q1 thru Q4	2N7000 transistor	LED power switching
1		DIL socket	20 pins	Microcontroller socket
4		Feet	Self-adhesive rubber feet	Tabletop protection
1		PCB	Roulette PCB	Printed circuit board

For the Battery Power Supply

Your kit came with components for a PP3 9V battery power supply. Please see the **separate instructions** for constructing and testing it.

Assembling your Project

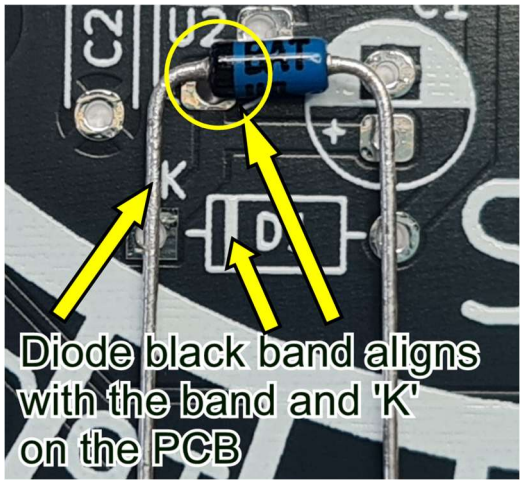
For your roulette project we'll assemble generally in order of component height, with the lowest height components being fitted to the PCB first.

Construction Order for this Project

For this project a good order for construction is:

- Lowest height components such as the diode and resistors
- Microcontroller socket
- Power connector J1
- Ceramic capacitors
- LEDs
- 7-Segment digital displays (leave their protective film on until the project is finished)
- Voltage regulator and Transistors
- Electrolytic capacitor
- Pushbutton & cap
- Mounting feet
- Then **after** initial testing, fit the microcontroller

The Diode D1

	**Diode**: has two wires, one is called the '**K**' connection wire. Diodes have to be fitted the correct way around with the **K** wire going to the right place – that shows which way the electricity is allowed to flow. The body of the diode has a **black band** around it where the **K** connection wire is. Bend the diode legs at right angles and fit the diode into its two holes so that the black band **K** connection wire aligns with the **square pad hole** and where the **band and 'K' is printed** on the PCB.
	The diode lays flat in its two holes on the PCB. Check before soldering – that you have the diode the correct way around or your project won't work.

The Resistors R1 thru R13 and R14 thru R17

The LEDs and displays of course need power, but LEDs and displays operate at only about 2V to 3V, so they could be damaged by our 5V power supply. Therefore to reduce the voltage and current that the LEDs and displays are supplied with, we have resistors in-line with the LEDs and displays. Resistors reduce the voltage and current similar to how standing on a garden hose restricts the water flow.

Resistors: don't care which way around they are fitted.

Bend the resistor legs at right angles so they fit into their two holes in the PCB.

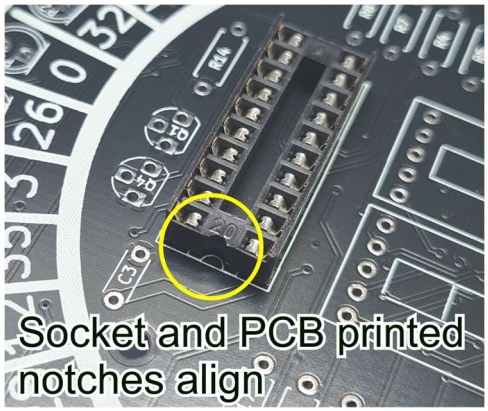
Note that there are **different values of resistors** in your project, it is important not to mix them up.

- **R1 thru R13 are <u>330R</u>**
- **R14 thru R17 are <u>10K</u>**

The resistors lay flat against the PCB.

☞ Check before soldering – that you have the correct resistor values in the right places or your project won't work.

The Microcontroller Socket



Because the microcontroller is sensitive to heat and to static electricity, there's a little socket into which the microcontroller is plugged after rest of the project has been built.

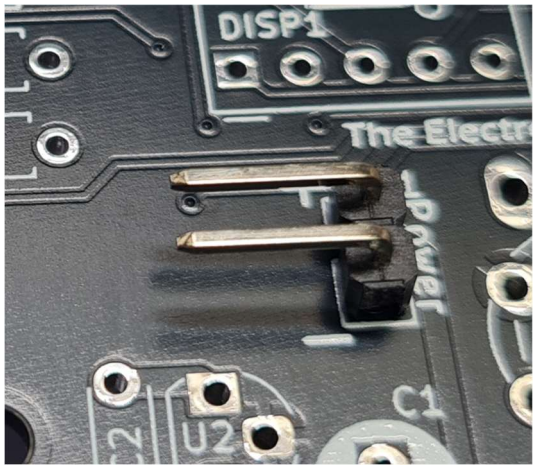
The socket has a **notch** that aligns with the printed **notch** (a semicircle) on the PCB, which is next to the printed "**U1**".

The socket fits flat with its 20 pins going into PCB holes.

Don't plug the microcontroller into the socket yet.

☞ Check before soldering – that the **notch** is in the right place and that **all socket pins** are through their holes.

The Power Input

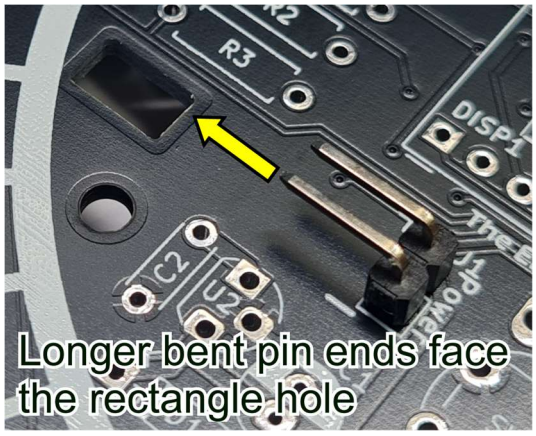


The Power Input is connector **J1**.

The connector is shaped like a right-angle.

This connector has two pins:

- a "**+**" positive power supply input
- a "**-**" negative power supply input.

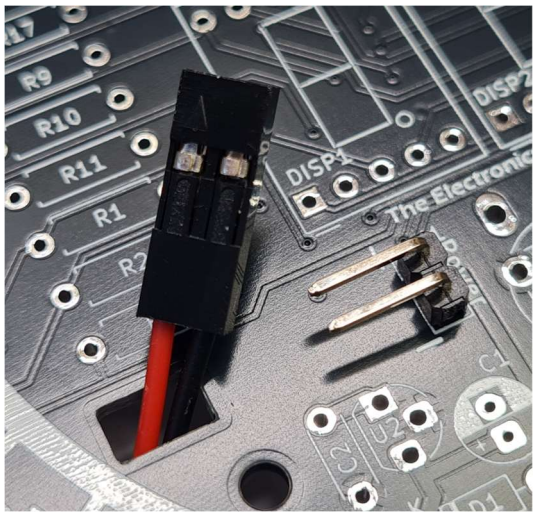


Two ends of the connector pins are already bent at right angles and are longer than the other ends.

These longer bent ends **face towards the rectangular hole** that is cut into the PCB.

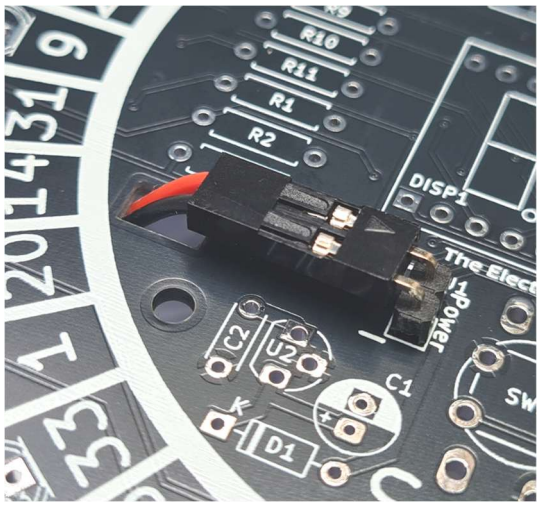
The shorter ends of the two pins have a black plastic surround.

Push these shorter ends through from the front of the PCB so that the black plastic lays flat against the front of the PCB like in the pictures.



The red & black power connection wires, switch, and PP3 battery connector are supplied with your roulette kit, and these have separate assembly instructions.

The red and black power connection wires and their socket will be pushed through the rectangular hole in the PCB, from the back of the PCB to emerge at the front.



Later on, when you've finished constructing everything and want to connect power, the power wires connector is plugged onto the J1 connector and the slack of the power wires are pulled through the rectangular hole.

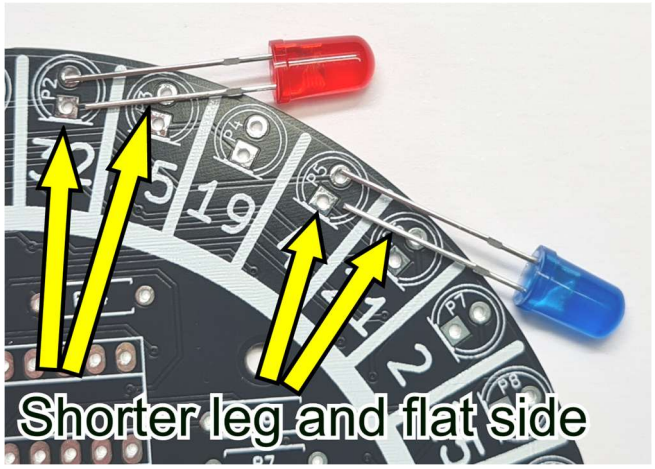
Don't fit the red and black cable yet.

The Ceramic Capacitors C2 and C3

Ceramic capacitors: the small yellow capacitors do not care which way around they are fitted.

The capacitors stand up in their two holes close to the PCB.

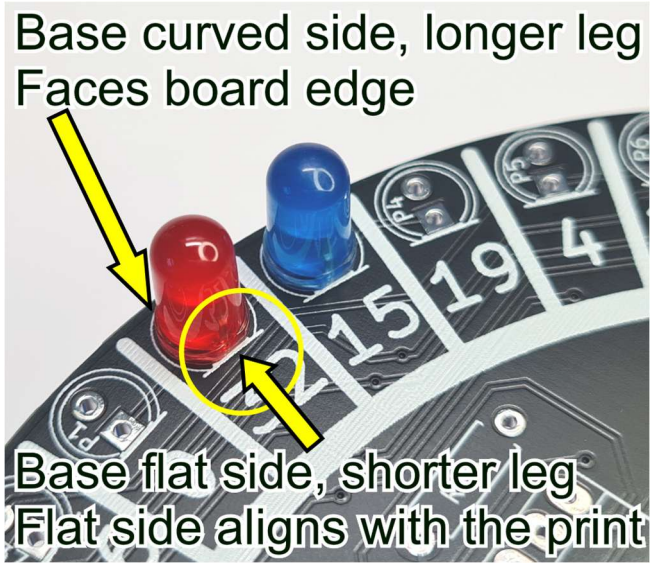
The LEDs



37 LEDs: the LEDs are wired to the microcontroller outputs, such that the microcontroller can control each LED separately.

For the Roulette Wheel it is important to **fit the LEDs with the correct colours** (see later in this document).

LEDs have to be fitted the correct way around. The LEDs have a **curved** side on the base of the body which has a **long** leg next to it, and a **flat** side on the base of the body which has a **shorter** leg next to it.

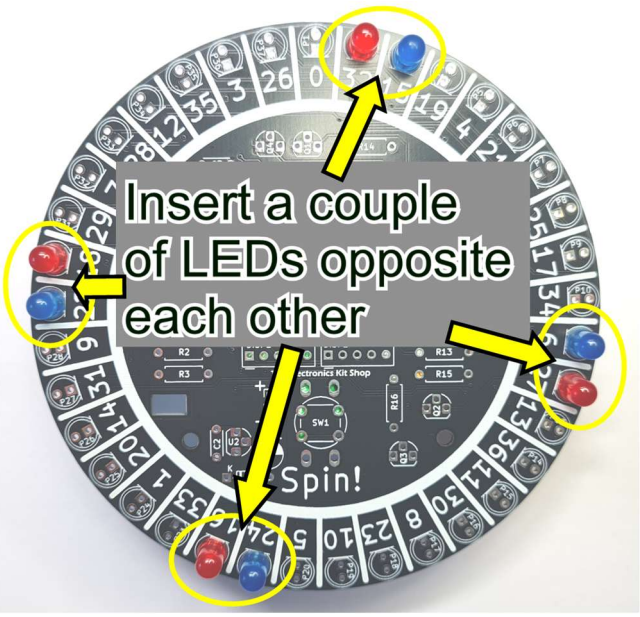


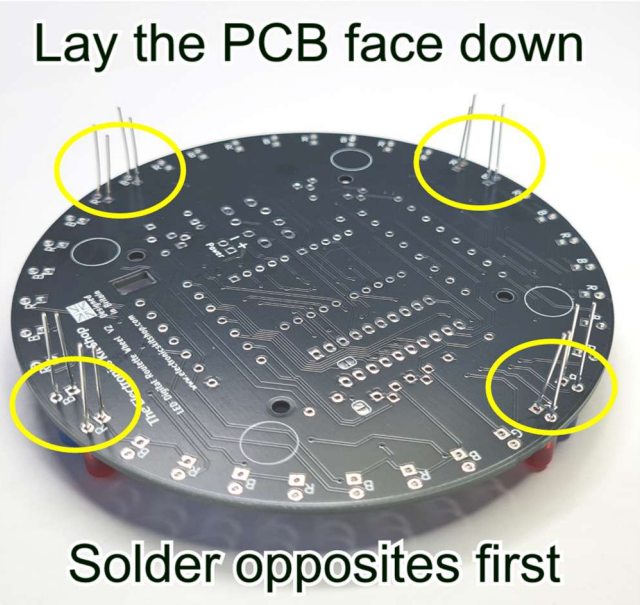
The printing for the LED locations on the PCB has a flat side. You align the base flat side shorter leg of the LEDs with the flat side on the PCB printing.

The base **curved** side long leg faces the ***edge*** of the PCB and the base **flat** side shorter leg faces ***into*** the PCB.

The LEDs should be fitted flat onto the front of the PCB, and aligned as best as possible to give you the very best final project appearance.

Be sure to solder them in the right way around.





When fitting the LEDs, it may be easiest to fit a few around the PCB opposite each other first. Then you can lay the PCB face down on the worksurface to solder them, and the LEDs will rest upon the worksurface to keep them level and aligned.

You can bend the legs out a little to hold them in their holes while you turn the PCB over.

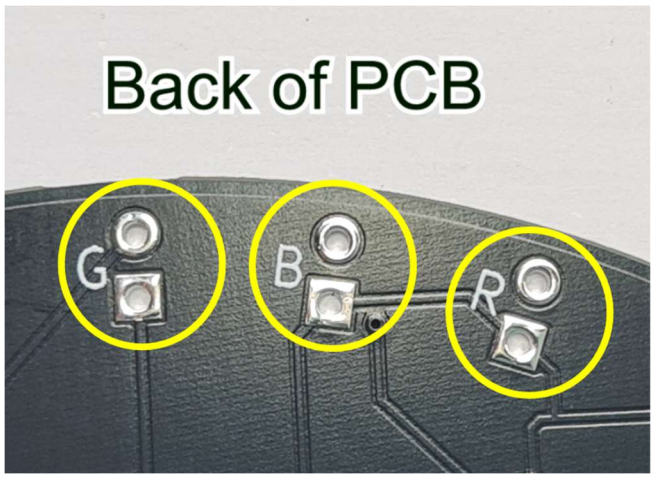
With these soldered in place, you can then begin to fill in the gaps between them.

☞ Take care to **fit the correct LED colours** – see below for the colour position details.

☞ **Check again before soldering** – that you have the LEDs the correct way around.

The LED Colour Positions

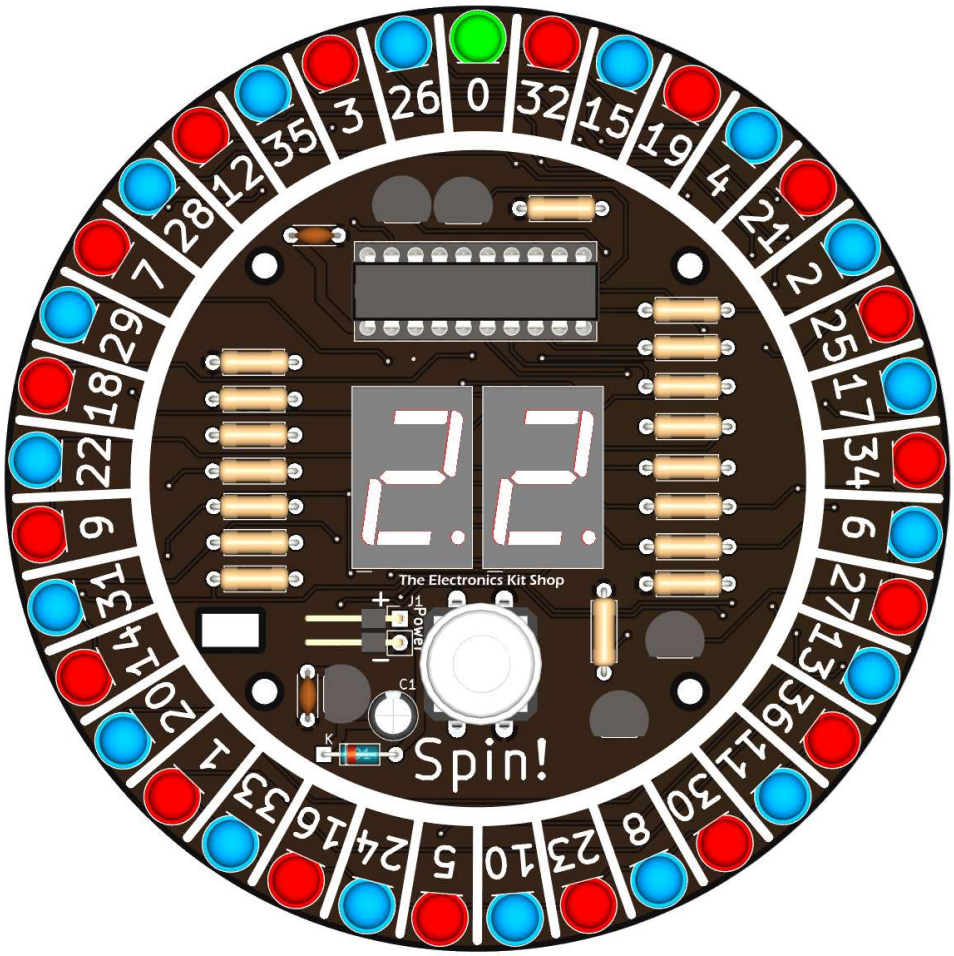
A real Roulette wheel has “pockets” with specific colours: green, red, and black. As there are no black LEDs in existence (or in fact black light bulbs of any sort), we use blue LEDs to represent the black pockets.



On the **back** of the PCB under where the LEDs go is printing to tell you which colour goes in that LED position:

- **G for Green**
- **B for Blue**
- **R for Red**

☞ **Check again before soldering** – that you have the LED colours in the correct positions.



LED Reference	Roulette Wheel Number	Colour
P1	0	Green
P2	32	Red
P3	15	Blue
P4	19	Red
P5	4	Blue
P6	21	Red
P7	2	Blue
P8	25	Red
P9	17	Blue
P10	34	Red
P11	6	Blue
P12	27	Red
P13	13	Blue
P14	36	Red
P15	11	Blue
P16	30	Red
P17	8	Blue
P18	23	Red
P19	10	Blue

LED Reference	Roulette Wheel Number	Colour
P20	5	Red
P21	24	Blue
P22	16	Red
P23	33	Blue
P24	1	Red
P25	20	Blue
P26	14	Red
P27	31	Blue
P28	9	Red
P29	22	Blue
P30	18	Red
P31	29	Blue
P32	7	Red
P33	28	Blue
P34	12	Red
P35	35	Blue
P36	3	Red
P37	26	Blue

The 7-Segment Digital Displays

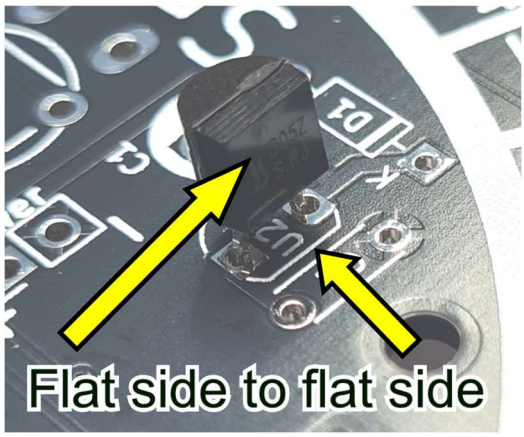
7-Segment Displays: in fact contain 7 rectangular LEDs. Switching on certain patterns of the 7 LED rectangles (called 7 "segments") can make numbers. Each LED segment is wired to the microcontroller, such that the microcontroller can control each LED segment separately to produce the numbers for the wheel score.

The 7-Segment displays have to be fitted the correct way up. They have a little dot (it is in fact a decimal point) at the bottom right, showing which way up they go.

The fronts of the displays have a peel-off protective film covering them which you should leave on until you've finished building your project to avoid damage to the displays.

☞ **Check again before soldering** – that you have the displays the correct way up.

The Voltage Regulator U2



Voltage Regulator: has 3 legs, and is curved on one side and flat on the other side. You fit the **flat side** on the regulator to align with the **flat side** on the PCB printing.

IMPORTANT: the Voltage Regulator **looks exactly the same as the four Transistors** which are also part of this project. It is **essential** not to get them mixed up.

The **Voltage Regulator has the number 78L05 or the number 805Z** printed somewhere on its flat face (there might be other numbers and letters too).

Push the voltage regulator into its three holes so it stands about 3mm above the PCB like in the picture.

The voltage regulator is quite a tight fit into its holes.

☞ **Check again before soldering** – that you are fitting the **78L05** or **805Z** device.

The Transistors Q1 thru Q4

In the wiring built into the PCB, the LEDs and 7-segment displays are grouped together and they are switched on by the microcontroller when it needs them to be on. But the groups of LEDs and 7-segment displays take a lot of electrical current, in fact they take more current than the microcontroller can handle. So in our project we have four *Transistors*. These transistors act as high current switches, a bit like relays. The microcontroller only needs to provide a small current to switch the transistors on, and when switched on the transistors can handle much bigger currents.

The transistors **look exactly the same as the Power Supply Voltage Regulator** – **it is vital not to get them mixed up** – they have very different internals and do very different jobs.

Transistor: has 3 legs, and is curved on one side and flat on the other side. You fit the **flat side** on the transistor to align with the **flat side** on the PCB printing.

Remember – the **transistors look exactly the same as the Voltage Regulator**. It is **essential** not to mix them up.

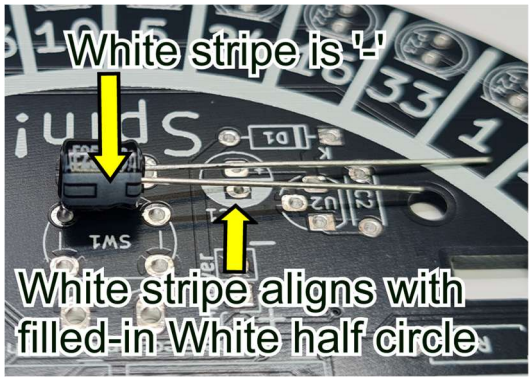
The **Transistors have the number 2N7000** printed somewhere on their flat face (there might be other numbers and letters too).

Push the transistors into their three holes so they stand about 3mm above the PCB like in the picture.

The transistors are quite a tight fit into their holes.

Check again before soldering – that you are fitting the **2N7000** devices.

The Electrolytic Capacitor C1



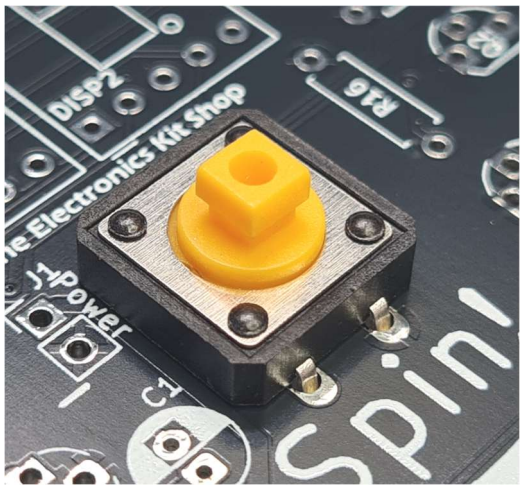
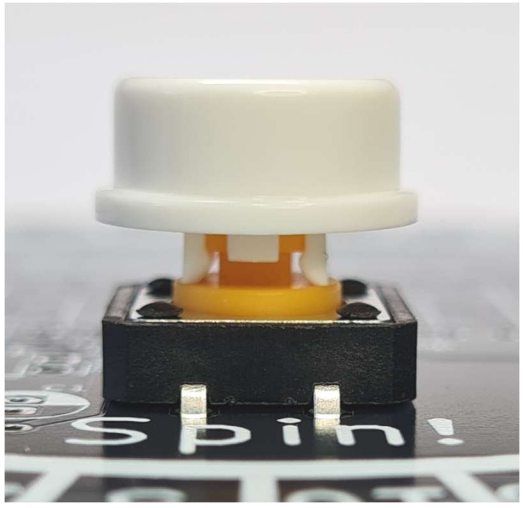
Electrolytic capacitor: is black and is cylinder shaped, and has '**+**' and '**-**' connections. It has to be fitted the correct way around.

The body of the capacitor has a **White Stripe** where the '**-**' connection is. You align that with the **filled-in Solid White** printed hole on the PCB.

Your electrolytic capacitor might have a longer or shorter body than shown in the picture.

	It is **vital** to fit electrolytic capacitors the correct way around.
	The electrolytic capacitor stands up in its two holes on the PCB. The electrolytic capacitor legs and their holes are quite close together; be careful not to accidentally short between them when soldering them. Check again before soldering – that you have the electrolytic capacitor **the correct way around**.

The Pushbutton SW1

	The pushbutton has four short legs. The legs form a rectangle and the button is pushed through from the front of the PCB so it lays flat against the front of the PCB like in the picture. There might be other PCB holes underneath the pushbutton – ignore these as they are for an alternative type of button. The button is a tight fit into its four PCB holes.
	The pushbutton has a plastic cap that is fitted over its top (white in the picture but colours vary). The pushbutton itself has a square shaped top. Align the square shaped clip on the bottom of the cap with the pushbutton's square top and push it firmly down. The cap clicks into place.

The Finishing Touches

There are four peel-off self-adhesive feet which can be fitted on the back of the PCB. These hold your project above the tabletop and help to stop it sliding.

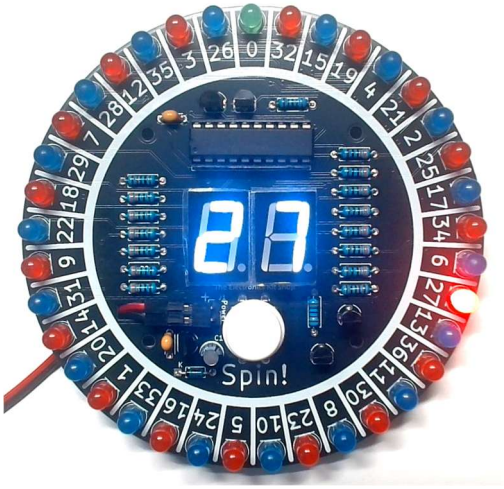
The four printed circles on the back of the PCB show where they go

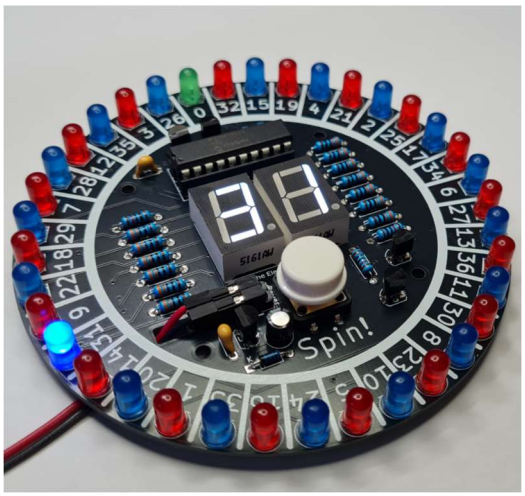
You can now also peel off the protective plastic film from the front of the displays.

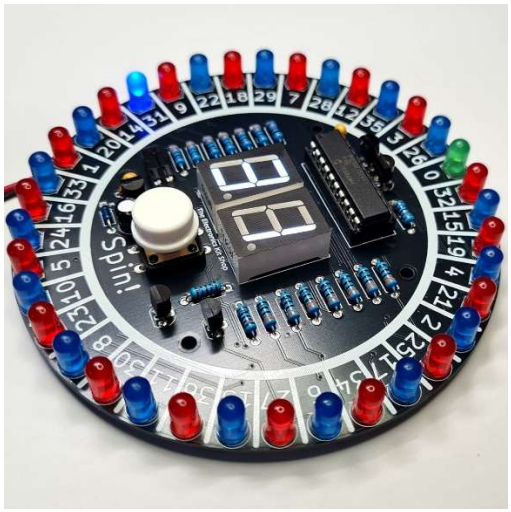
Your project construction is now complete.

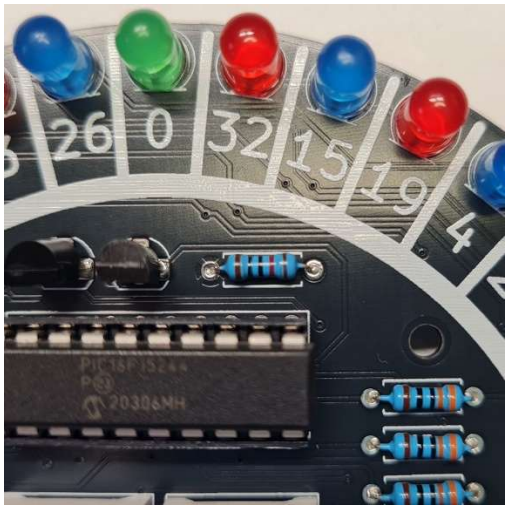
Your Finished Project

Here is the finished project with the microcontroller fitted – but remember you won't have the microcontroller fitted until the initial testing has been done.









Testing your Project

First visually inspect the PCB

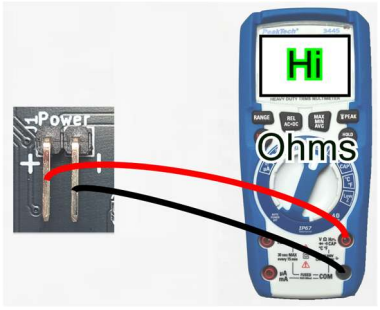
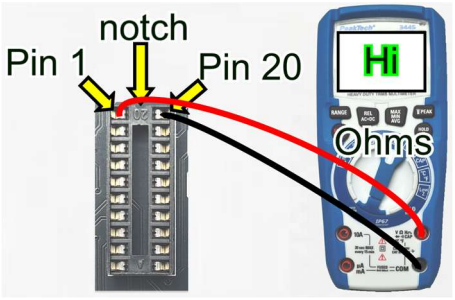
Before inserting the microcontroller into the socket and applying any power, visually check the PCB, so for example:

- Are all the solder joints good – ***this is by far the most common cause of problems***
- Are any components loose
- Are all components in their correct places
- Are they all the correct way around
- Are there no metal parts of components touching each other
- Are there no visible short circuits between the holes (pads) on the PCB
- Are there any tiny pieces of metal or solder which could cause short circuits

It is advisable to test with a multimeter – this is a most valuable tool for project constructors. If you don't have a meter your testing is limited and you can skip the next section regarding *Testing with a Multimeter*.

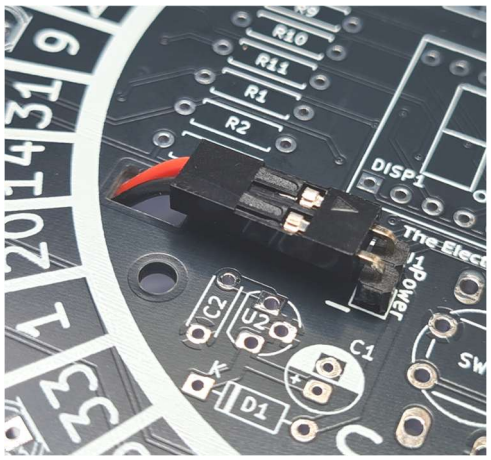
Testing with a Multimeter

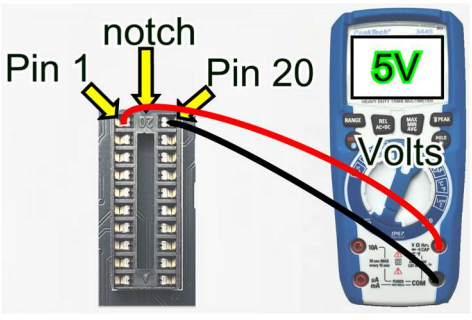
Check for power supply short circuits

	Set your meter for "**Ohms**" and check the resistance between the **"+"** and **"-"** pins on the power input connector **J1**. There should be extremely **high** resistance, and this indicates that there is no short circuit on the PCB power input. Any short circuits need to be found and fixed before moving on with the testing.
	Set your meter for "**Ohms**" and check the resistance on the microcontroller socket between pin **1** (left of notch) and pin **20** (right of notch). These are the circuit power pins and are the output of the 5V power supply regulator. There should be **high** resistance, and this indicates there are no shorts on the circuit power supply. Any short circuits need to be found and fixed before applying power to the PCB.

Check that the 5V power supply is working

If there are no short circuits, the PCB can be tested with power applied. Do this initially with the microcontroller **not** in its socket.

	Push the power wire plug through the rectangular hole and plug it onto the J1 connector. Pull the slack of the power wires back through the rectangular hole. Make sure to plug the power connector on so that: **+** the Red wire, is the **Positive** Power Input **-** the Black wire, is the **Negative** Power Input ☞ It is important not to get these the wrong way around.



Set your meter to measure **DC** volts (***not* AC** volts).

Switch on the power to your project.

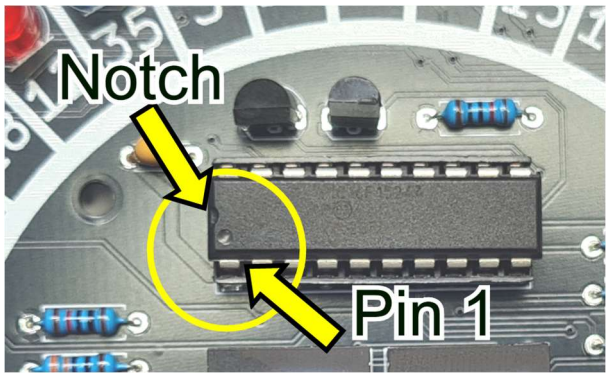
Now check the voltage seen between the microcontroller pins **1** and **20**. It should be very close to **5V** (likely it won't be exactly 5V but that is OK).

If there is no 5V at all – remove the power, and first check that you had you meter set for **DC Volts** and ***not AC Volts***. Then check that the diode is fitted the correct way around (remember, diodes can block electricity if they are the wrong way). If the diode is correctly fitted, check again for short circuits. Some short circuits are extremely small and difficult to spot. Any short circuits need to be fixed before going further.

If approximately 5V is there – excellent. You can fit the microcontroller and try your project.

Now fit the Microcontroller – and See if it Works!

Fit the microcontroller with the **power disconnected**. As the microcontroller is static sensitive, it is best to fit it while wearing an antistatic "Earthing Wrist Strap". If you don't have an Earthing Wrist Strap, it is worthwhile getting one, or safely touch something 'electrically grounded' while handling static sensitive devices.



Very carefully align the microcontroller with its socket, making sure pin 1 is in the right place. Pin 1 is to the bottom left of the notch on the socket. The notch on the microcontroller aligns with the notch on the socket and on the PCB printing.

Then, making sure all pins go into their respective socket holes, gently and evenly push the microcontroller down into its socket.

Then check again that:

- The microcontroller is the correct way around
- All pins are in their socket holes

Now you can connect power and check that the microcontroller is working.

Connect power and try your Project

Connect the power to the PCB, taking care to get the '**+**' **RED** and '**-**' **BLACK** wires the correct way around (like in the pictures above), and switch on the power. All being well, the microcontroller will come to life – the **Green Zero** LED will light and the 7-Segment display will show the number **Zero** - and that's great! If you now press the **Spin!** Button, the 'ball' LED should move quickly around the outside, and the displays should rapidly show changing numbers.

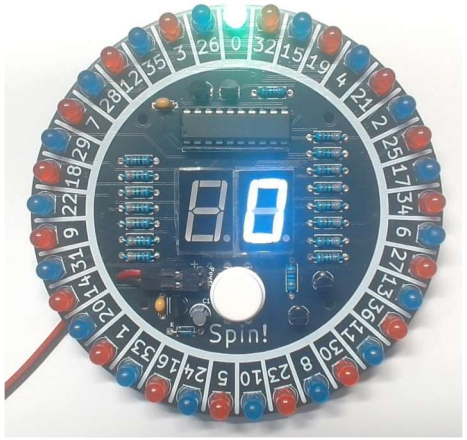
If there is no LED or display activity, remove the power and:

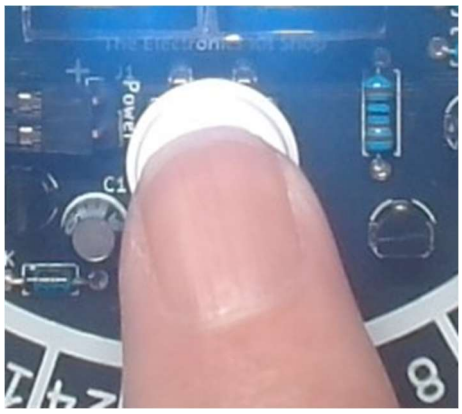
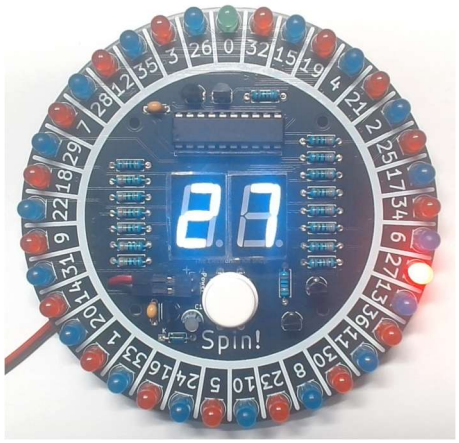
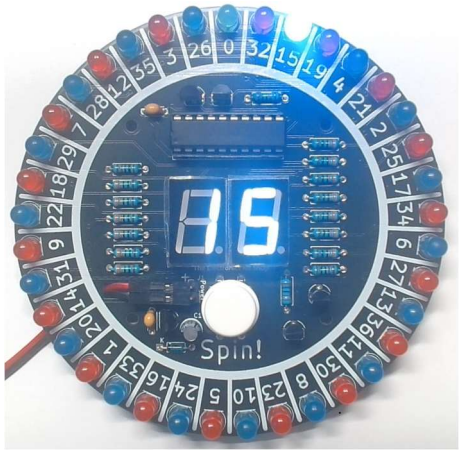
- Check that all solder joints are good and solid and nothing is loose - **by far this is the most common cause of project problems**
- Check the microcontroller is plugged in correctly, is the right way around, and all pins go into their socket holes
- Check that the battery has good charge remaining. Try a new battery
- Check there are no short circuits
- Check that the LEDs and displays are the correct way around
- Check that the resistors and transistors are correctly fitted
- Check that the diodes are the correct way around

If it's not going too well

Don't worry, please contact ***The Electronics Kit Shop*** via the website or email address at the end of this document for technical help.

Playing your Roulette Wheel Game

	When you connect power, the green **Zero** LED lights, and the digital display shows **Zero**. The game is ready to play.

	Press the "**Spin!**" button to start the wheel spinning. You can briefly press the button, or if you hold it down, the wheel spins for as long as you hold it.
	After you press and release the "**Spin!**" button, the LED moves quickly clockwise around the LEDs on the outside of the wheel, lighting up one LED at a time. As the LED moves around, the digital display shows the current position number that the LED is passing.
	After a few seconds the LED slows down and eventually stops on your score, and the digital display flashes your score. Press the "**Spin!**" button to play again. You can't press the "**Spin!**" button again until the wheel has stopped spinning. When you have finished playing your roulette, just switch off or remove the power.

Please note that this project:

- Contains **flashing lights**
- Is **not suitable for small children due to small parts**
- Must be used only for the purposes of fun and amusement, and totally randomised scores are not guaranteed
- Is for occasional indoor domestic UK home use and must not be used near sensitive electronic or medical equipment
- Is for hobbyist construction and enjoyment, not intended for resale or export in unassembled or assembled form

- Must be protected from extremes of temperature, rain and moisture

If the LEDs on the project begin to dim, or the project begins to malfunction or no longer comes on at all when you connect power, it is likely the battery needs to be replaced.

You might like to mount the finished project into an enclosure with its battery inside and with the power switch on the side of the enclosure. There are four useful M2 size mounting holes for fitting the PCB.

And for the environment - always dispose of electrical waste in the proper facilities.

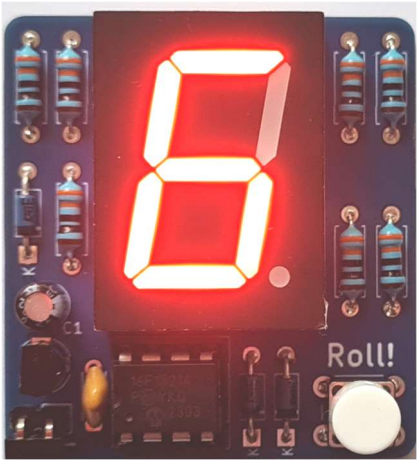
And finally….

You have successfully constructed your project, and now to enjoy it.

You also might like to build one of the other great games in the range.

There are 15 Great Games in the range

Single Digital Dice Kit




LED Circle Dice Kit


LED Hexagon Dice Kit


LED Dice Kit
Roll!


LED Digital Dice Kit
Roll!


Dual Digital Dice Kit
Roll!


Super Big LED Dice Kit
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10mm LEDs !

New for 2026 	***... and more coming soon***

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