

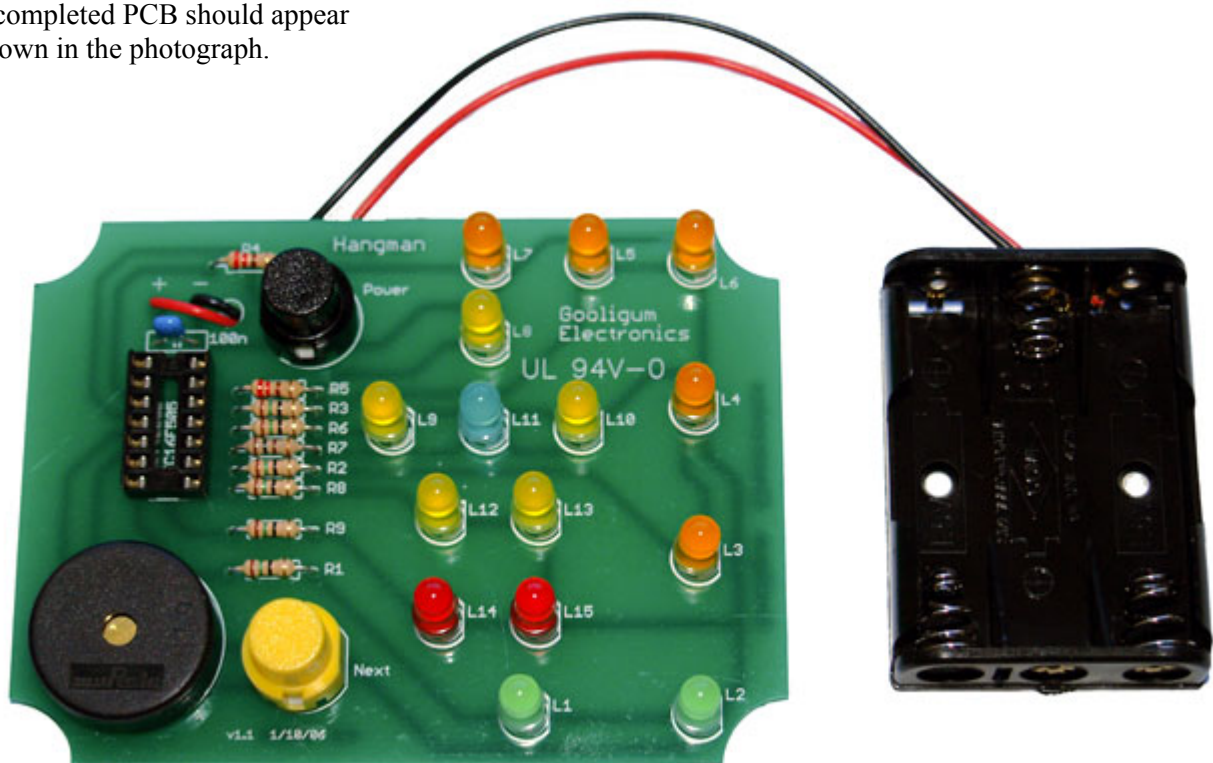
The last components to attach to the PCB are the pushbuttons. Be careful to install them with the flat edge as shown on the overlay. Before soldering the battery holder leads, you should test the circuit.

Insert the batteries into the holder, and plug the negative (black) battery lead into pin 14 of the IC socket. Pin 1 is immediately to the left of the notch on the top end of the socket, when viewed from above. The pins are numbered counter-clockwise, with pin 14 to the right of the notch.

If you now touch the positive (red) battery lead to pin 1 of the IC socket, no LEDs should light. Touching the positive lead to pin 2 should light the LED at L7 (only). Pins 3 and 4 are connected to the switches, so no LEDs should light when they are touched by the positive lead. Pin 5 is connected to the buzzer; touching pin 5 should not light any LEDs, but you may hear a 'click'. All the other pins, from 6 to 13, are connected to LEDs. As each is touched, a different LED, or pair of LEDs, should light, in accordance with the circuit diagram. If different pins light the same LEDs, you probably have a short circuit somewhere. If one or more of the LEDs do not light at all, check for dry solder joints or that you have installed the LEDs the wrong way around. You can test that by reversing the battery leads.

If these checks are all ok, you should remove the batteries from the holder before threading the battery leads through the hole near the IC socket, from the back, then soldering them with the red lead in the '+' hole and the black lead in the '-'.

The completed PCB should appear as shown in the photograph.



Now insert the PIC into the IC socket (or solder it to the board, if you're not using a socket), taking care to install it the right way around – the notch in the chip aligns with the notch in the socket, and the PCB overlay. Then put the batteries back into the battery holder.

The hangman game should now be operational, although it is likely that none of the LEDs are lit. If any LEDs are lit, pressing the “Power” button should turn them off. Pressing the “Next” button should then light the LEDs in sequence, culminating with the man flashing and the buzzer beeping. If it doesn’t work, go back and check your circuit, and that you have the PIC installed correctly. If the circuit passes the tests above, you probably have a problem with your PIC chip and it may need to be reprogrammed or replaced.

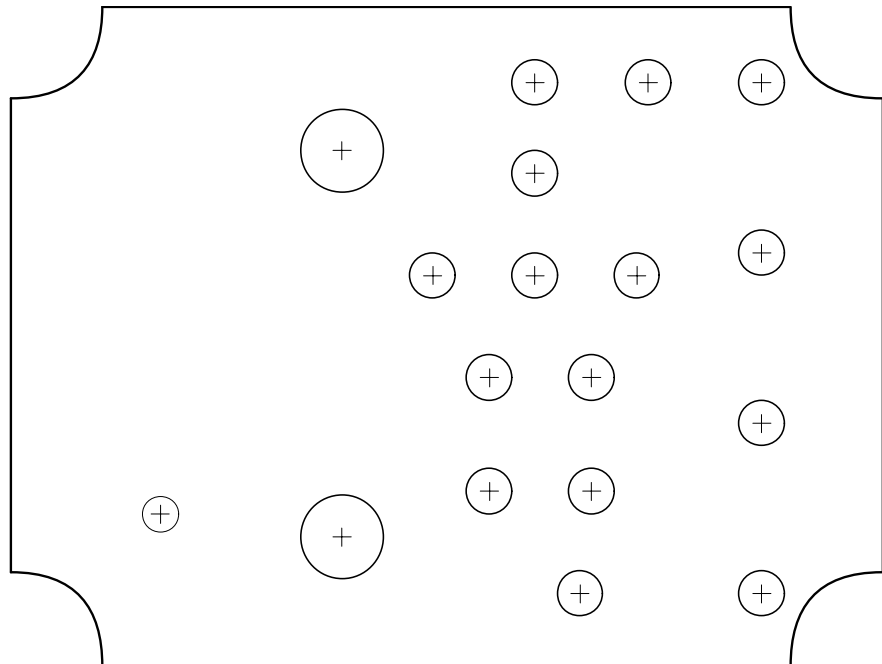
### Final Assembly

The PC board is designed to be installed into a plastic enclosure, with a lid measuring 102mm × 77mm.

Use the guide on the right (also available as a PDF file) when drilling the holes in the lid.

The holes for the LEDs should be 5mm and the holes for the buttons 10mm. The hole at the lower left is for the piezo sounder; it should be around 3mm, but the size is not important as this hole will be covered by the panel artwork.

Tip: print the drill guide, cut it out and glue it to the lid, using a water soluble glue (such as a glue stick). Drill the lid through the paper, when the glue has dried. When finished, soak the lid in water to remove the guide.



When drilling holes in plastic, it’s usually easiest to drill a smaller pilot hole first, and then expand the hole with a larger drill. After drilling, you will probably need to tidy up the holes with a file or sandpaper.

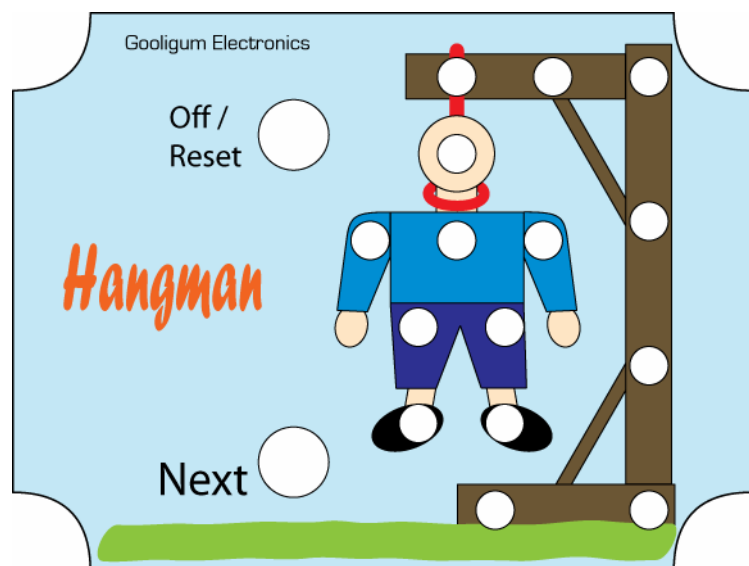
The full kit includes the lid (or “panel”) artwork, as illustrated here, printed on an adhesive label. Alternatively, you can print the artwork from the PDF file available for download from [www.gooligum.com.au](http://www.gooligum.com.au).

Cut around the label’s outline, then cut out the holes for the LEDs and buttons.

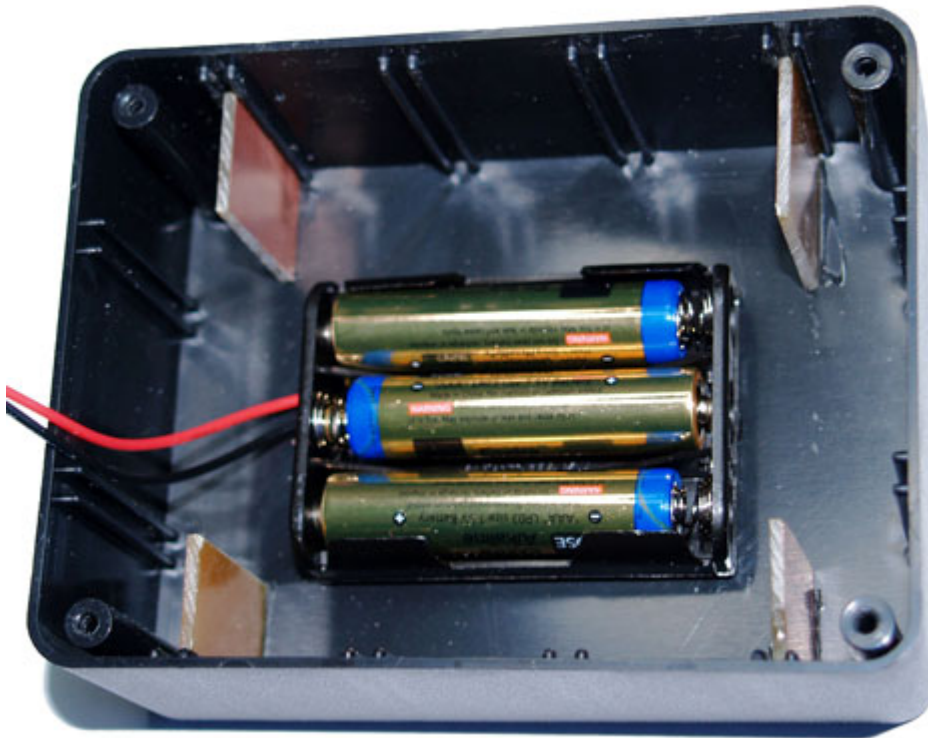
Now affix the label to the lid. It is easiest to align the label correctly if you first place the lid over the completed PCB, pushing it into place until the LEDs and buttons protrude far enough through the holes to serve as a guide for the artwork label.

Along the inside of the supplied case are PCB slots – four on each of the long sides. These can be used to hold supports for the PCB.

Suitable supports can be made from PCB or prototype board off cuts (supplied in the full kit). Cut them into rectangular pieces, approx 26mm high and 15-20mm wide. The supports should be high enough that, when



the PCB rests on these supports, the LEDs protrude through the holes in the lid, but not so high that the lid cannot close properly. The supports must all be the same height, or else the PCB won't rest evenly on them.



Glue the supports into the PCB slots at the ends of the long sides, using "Super Glue" or similar, as shown in the photo on the left.

The battery holder is affixed to the bottom of the case with double sided adhesive tape.

The PCB can now be rested on the supports, taking care that the leads from the battery holder are not caught. Screw the lid in place, and you're done!

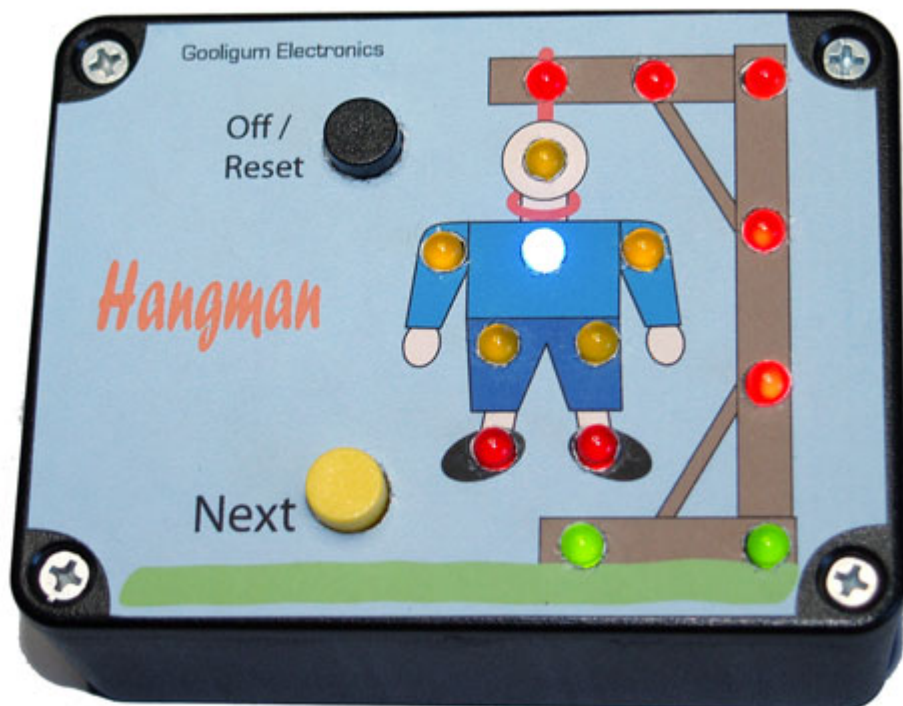
## Operation

Hangman is quite straightforward to use.

When in standby mode, with all the LEDs turned off, pressing "Next" will turn it on, lighting the first pair of LEDs (the base of the gallows).

Subsequent presses of "Next" light successive LEDs, in nine stages, until, on the nine press of "Next", the LEDs representing the feet of the hanged man are lit and the LEDs representing the man begin to flash, the piezo sounder beeping on each flash. After ten flashes, the game returns to standby mode; all LEDs are extinguished.

If, at any time during the game, the "Power" button is pressed, the game returns to standby mode.



The “Power” button is marked “Off / Reset” on the panel artwork because it performs two functions: it is used to reset the game if the word is guessed before the man is hanged, and also to turn it off when finished. These functions are really the same; they both place the circuit in a low-power standby mode.

The game also places itself into standby mode after 10 minutes of inactivity.

That’s all there is to it – have fun playing hangman!

## Parts List

1	Pre-programmed PIC16F505-I/P
1	100nF monolithic capacitor
6	18Ω 1/4W resistors
1	100Ω 1/4W resistor
2	220Ω 1/4W resistors
15	5mm LEDs – 2 × green, 5 × orange, 5 × yellow, 1 × blue, 2 × red
2	9mm PCB push button switches
1	PCB ext drive piezo sounder, 10mm spacing (e.g. muRata PKM22EPPH4001-B0)
1	3-way AAA flat battery holder with fly leads
3	AAA cell batteries (preferably alkaline)
	Double-sided foam tape (to mount battery holder)
	Suitable project case, at least 100mm × 75mm (e.g. DSE H2919)