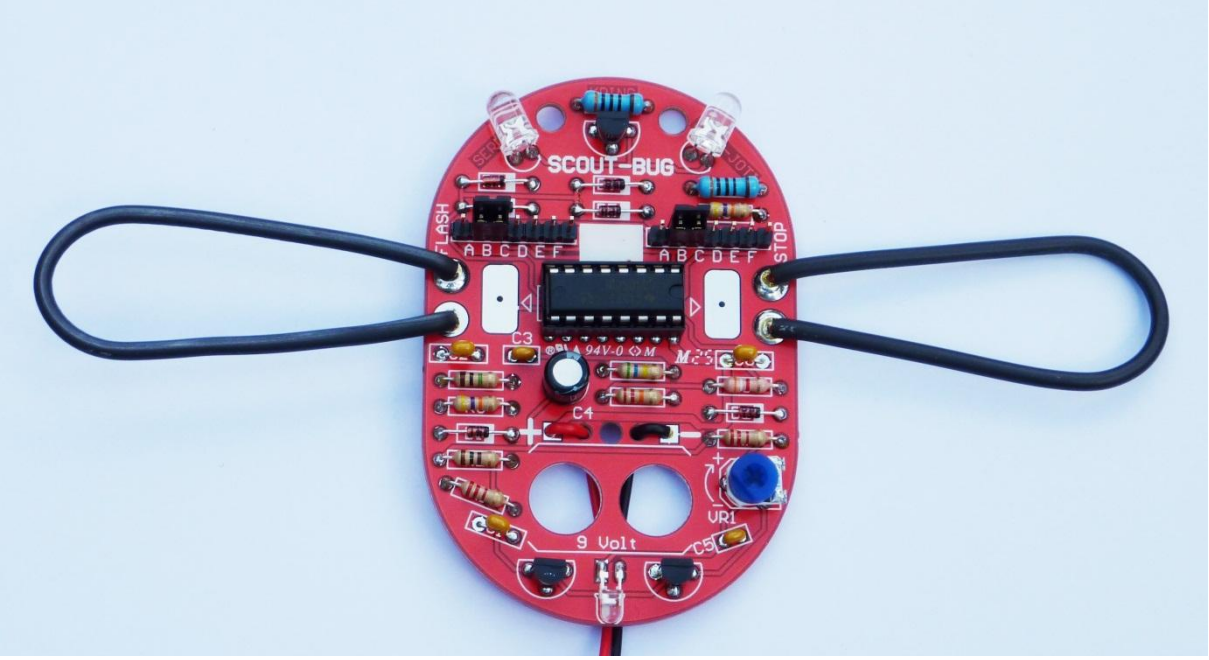
SCOUT-BUG 2012



Manual SCOUT-BUG kit.

A project of the Service Kring JOTA-JOTI.

Love the SCOUT-BUG?
Have good ideas?
Wan' a show what you've done with your SCOUT-BUG?
Then join the PIMP your BUG contest and win?
Read all about it on the last page!

SCOUT-BUG 2012

Contents:

Remarks:

Unlike previous years, all documentation concerning the kit is combined in a large document. This keeps, beside the building description, all background information and other information on one place.

For the guidance during soldering, we recommend to this entire document. For the building itself, printing page 6 & 7 will be sufficient . During construction it can easily be used as a reference to Keeping page 10 and 11 also at hand as a reference could be helpful when your building . Building one kit before the JOTA-JOTI weekend is besides educational, also very nice

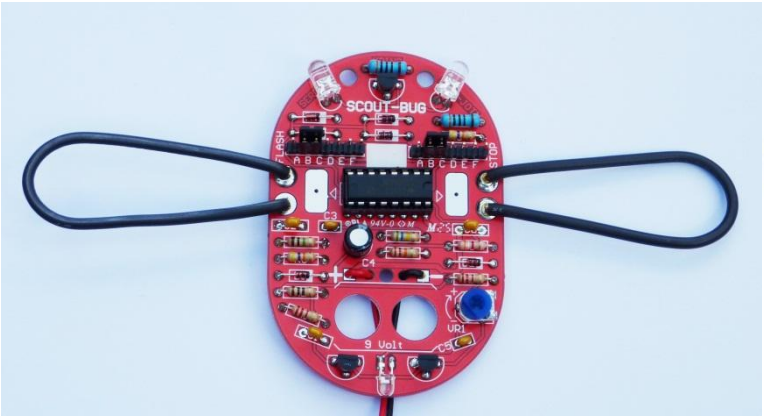
With the kit a red PCB is supplied. Some of the photos were taken by our prototypes which had a green PCB….

Don't forget: join the Pimp your SCOUT-BUG contest!

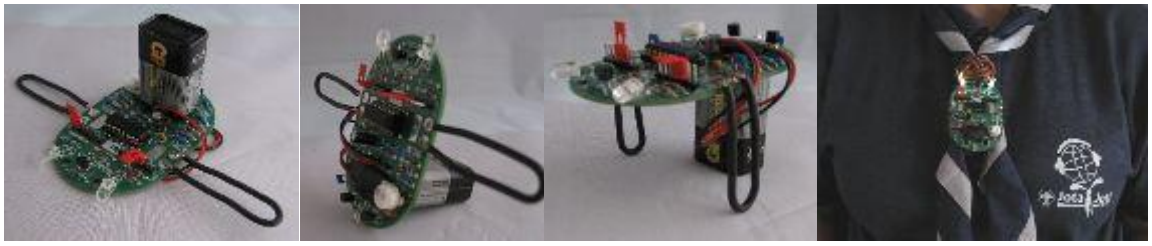
SCOUT-BUG 2012

Introduction:

This year, the Service Circuit JOTA JOTI again succeeded in creating a fun and educational construction project to put together and we have called it the SCOUT-BUG. Like previous years, this kit is designed for soldering it together by children (under supervision) and by doing so the children will become acquainted with electronics.
The SCOUT-BUG is an interactive flasher that can react to stimuli from the environment. The SCOUT-BUG can respond to Scout-Bugs and , for example, flashes of light from a flashlight, an infrared remote control or just very opinionated, self-flashing. In order to be able to respond, the SCOUT-BUG is equipped with a light-sensitive sensor. With what lighting effects SCOUT-BUG will respond and how quickly it responds, both can be set. With some BUG's spectacular lighting effects can be made, for example a huge chase!
With a little imagination you can see, that the design of the SCOUT-BUG is based on an Android logo..



By applying some copper wire as "wings", the SCOUT-BUG can be worn or placed in various ways. This allows the SCOUT-BUG used as "tie-insect" or evening play. On the white square above the IC c a a name or number can be written.



Good luck with the construction and use of the SCOUT-BUG!

SCOUT-BUG 2012

Contents of the kit:

The following table can be used to control the contents of the kit. Solder, a 9 volt battery and (installation) wire, if desired, for the "wings" ,is not included.

Component	Value	Qty	Position on PCB	Remarks
Resistor	100 Ω	1	R2	Brown, Black, Brown, Gold
Resistor	300 Ω	2	R10, R11	Orange, Black, Black, Black, Brown
Resistor	2.2 KΩ	1	R1, R7	Red, Red, Red, Gold
Resistor	3.9 KΩ	1	R8	Orange, White, Red, Gold
Resistor	22 KΩ	1	R5	Red, Red, Orange, Gold
Resistor	47 KΩ	2	R3, R9	Yellow, Purple, Orange, Gold
Resistor	560 KΩ	1	R6	Green, Blue, Yellow, Gold
Resistor	1 MΩ	1	R4	Brown, Black, Green, Gold
Diode	1N4148	6	D1 t/m D6	
LED	White	2	D7, D8	5 mm diameter
Phototransistor	BPX85	1	Q1	3 mm diameter, looks like LED
Transistor	2N3904	3	Q2, Q3, Q4	
Potentiometer	1 MΩ	1	VR1	
Capacitor	10 nF	2	C3, C5	Yellow, inscription 103, pitch 2,5 mm
Capacitor	100 nF	3	C1, C2, C6	Yellow, inscription 104, pitch5 mm
Capacitor	10 µF	1	C4	Black, beware of polarity
PCB		1		
IC- socket	16 pins	1	IC1	
IC-Chip	CD4060	1	IC1	
9 volt battery clip		1		
Pin-header	14 pins	1	Flash, Stop	Cut it, 2 x 7 pins required
Jumper		2	Flash, Stop	

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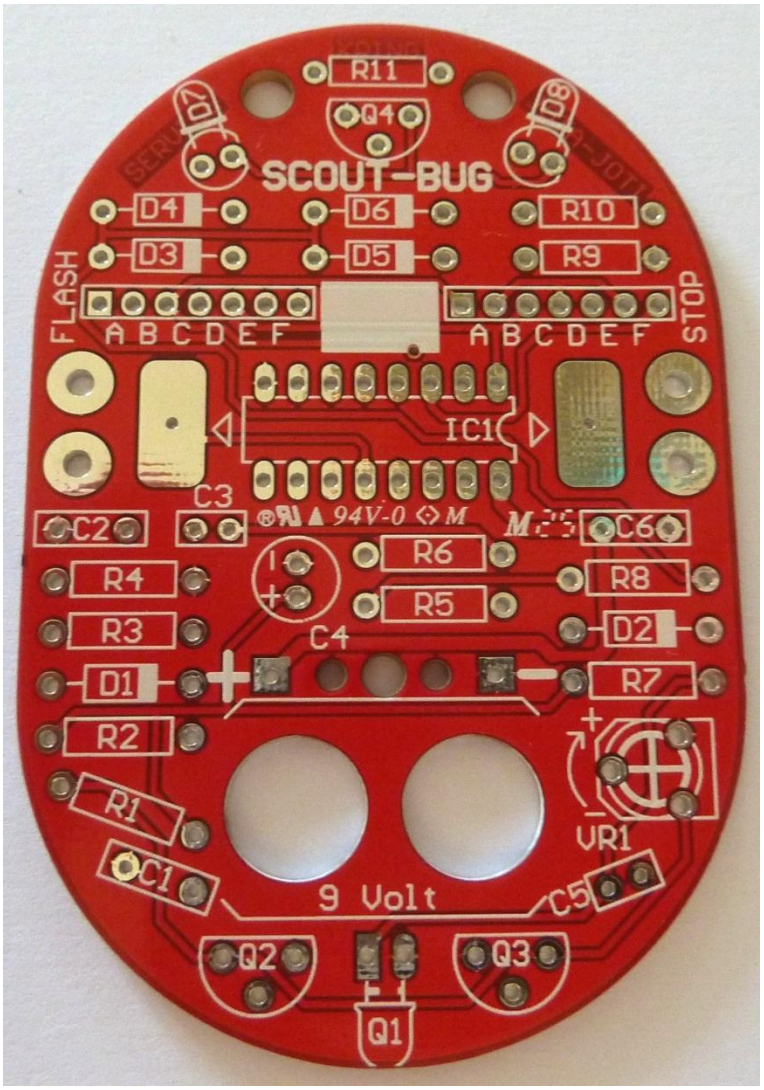
Component numbering and component values:

Position	Component
R1	2.2 KΩ
R2	100 Ω
R3	47 KΩ
R4	1 MΩ
R5	22 KΩ
R6	560 KΩ
R7	2.2 KΩ
R8	3.9 KΩ
R9	47 KΩ
R10	300 Ω
R11	300 Ω
D1	1N4148
D2	1N4148
D3	1N4148
D4	1N4148
D5	1N4148
D6	1N4148
D7	LED
D8	LED
Q1	BPX85
Q2	2N3904
Q3	2N3904
Q4	2N3904
VR1	1 MΩ
C1	100 nF
C2	100 nF
C3	10 nF
C4	10 µF
C5	10 nF
C6	100 nF
IC1	IC- socket
IC1	CD4060
Flash	7 pins header
Stop	7 pins header



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Building Description SCOUT-BUG:

The easiest way to assemble the kit is to start with the components which have the least height, and then go to higher parts. We start with the resistors so that we can practice before we get to the more vulnerable parts to mount. All resistors and diodes are mounted lying down. For this bend both wires at an angle of 90 degrees, taking into account the distance between the holes on the circuit board. Insert the resistors(or diodes)on the component side and bend the wire on the solder side slightly, then the parts will not fall out when you turn the board for soldering.
Tip: The balls at the beginning of each line can be colored to indicate which components are already mounted.

Assembly sequence:

Mount the following resistors in this order:

- R1, R7: 2.2 k (red, red, red, gold)
- R2: 100 Ω (brown, black, brown, gold)
- R3, R9: 47 k (yellow, purple, orange, gold)
- R4: 1 M (brown, black, green, gold)
- R5: 22 k (red, red, orange, gold)
- R6: 560 k (green, blue, yellow, gold)
- R8: 3.9 k (orange, white, red, gold)
- R10, R11: 300 Ω (orange, black, black, black, brown

- Mount diodes D1 t / m D6 1N4148 (small reddish glass tube).

NOTE: the stripe on the diode must match the thick line on the PCB.

- Mount IC socket, IC1 (16 pin).

NOTE: In one of the ends of the IC socket sits a notch, which should correspond to the drawing on the board. (Make sure all pins through the PCB back stabbing before you solder).

- Mount the pole both 7-pin headers (Flash and Stop).

NOTE: a pin-header with 14 pins is attached, it should carefully be cut in half with a sharp forceps. Both halves can now be soldered to the PCB. The easiest is to solder the center pin a little and then by slightly heating the header press the header neatly to the board. After that solder the remainder of the pins.

- Mount potentiometer VR1, which can be mounted only one way.

Install the following capacitors:

- C1, C2, C6: 100 nF (yellow, labeled 104)
- C3, C5: 10 nF (yellow, labeled 103)

- Install electrolytic capacitor C4 (black, round).

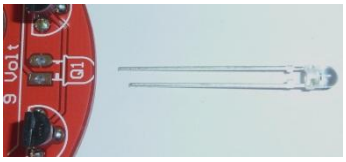
NOTE: this capacitor have 2 wires, one of which is longer than the other. The longest wire is the + terminal and should be marked with plus in the hole of the PCB.

- Mount the 3 transistors Q2, Q3 and Q4 (2N3904).

On the print is clear to see how this should be mounted. Carefully bend the legs slightly apart so they easily can be inserted in the print.

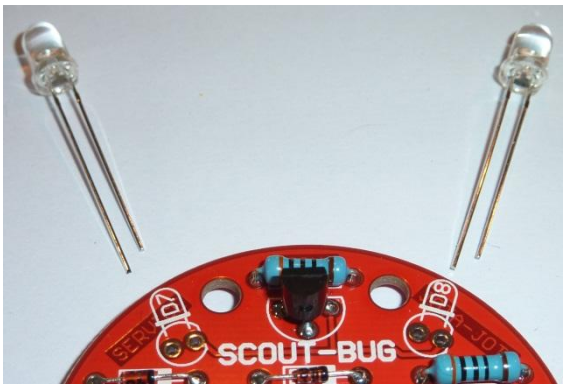
- mount photo transistor Q1, which can be upright or lying down as desired be fitted.

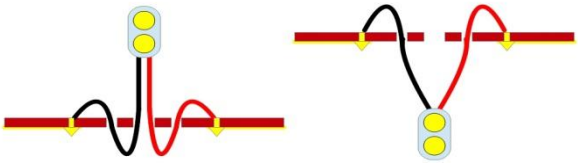
NOTE: This looks like a small LED and unlike a "normal" transistor has only 2 connections. On the PCB, with some effort, to see how this is to be mounted. Easiest to remember is that the short leg goes in the rectangular solder - island.



- Install two LEDs, D7 and D8.

NOTE: this must be properly fitted. If we accept that the print so we can read the text then the long lines in the left cavities. See photo:





- Install the battery connector.

Please pull the wires through the large holes of the print and insert them from above in the print. Solder and then pull the wires tight. In this manner is prevented that the wires will easily break. The red wire is connected to the +, the black wire to the -. As shown in the drawing it can be done in two ways depending on which side you want the connection the end up.

- Insert IC1, CD4060 carefully into the IC socket.

NOTE: In one of the ends of the IC is a notch (slot), which should correspond to the drawing on the board and the previously mounted IC socket. The legs of the IC are slightly outwards, bend inwards before inserting the IC in the socket outlet. The easiest way for this is to hold the legs of one side on the table and tilt the IC a little bit. Do the same for the other side of the IC. If the IC is plugged into the socket, make sure there are no legs bent double. You can do this by looking from the notch side under the IC..

The SCOUT-BUG is now assembled and ready to be adjusted and tested!

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Adjustment and usage:

Adjustment:

Once the SCOUT-BUG is soldered together and the IC is placed we can start testing.
Place a jumper on connector C and D of the FLASH header, turn VR1 fully counterclockwise. Do not place jumper on the header STOP!
If we connect a battery, both LEDs will flash. If we turn VR1 slowly clockwise, we see that the LED's just very quickly start to flash and then completely shut off. Turn the potentiometer as far back to where both LEDs blink normally again (adjust not too tight). The adjustment is now complete. Test, as described below usage. In exceptional cases it may be required to change the setting slightly.

Usage:

Als flasher light effect:
The STOP jumper is not placed, the SCOUT-BUG can be used as normal blinker light effect.
By means of varying the location of the FLASH-jumper the flash of light can be controlled. For a quick brief flash we place the jumper on A and B. By moving the jumper place by place the flash will get longer and the flashing slow down. However, it can be made even better when we use on the FLASH part both two jumpers. This is possible without risk, and in this way a rhythm can be created . Try it!

Triggered by lightning flash:
If we want the SCOUT-BUG to reacts to the environment we need to use the STOP jumper locations. For example, start with the two jumpers on CD and CD. If we have a flash dropped on Q1 drop the LED's will flash on and then go out again. It is important that it is a flash of light, continuous light on the SCOUT-BUG will not provide a response. By playing with both jumpers you can define how fast the SCOUT-BUG flashes and how long it keeps flashing.
NOTE: the STOP jumper will determine how long the SCOUT-BUG can blink. If we put this on a very short time (e.g. AB mode) then the flash time will be longer than the STOP time, in which case the SCOUT-BUG will do nothing! Just try it.

Did you know: that the SCOUT-BUG also can be triggered by means of a touch switch?
By touching both silver spaces next to the IC at the same time the SCOUT-BUG blink.
If you use bare wire for the wings then you can connect the wings with the two patches. Once the wings are then touched the SCOUT-BUG flash..

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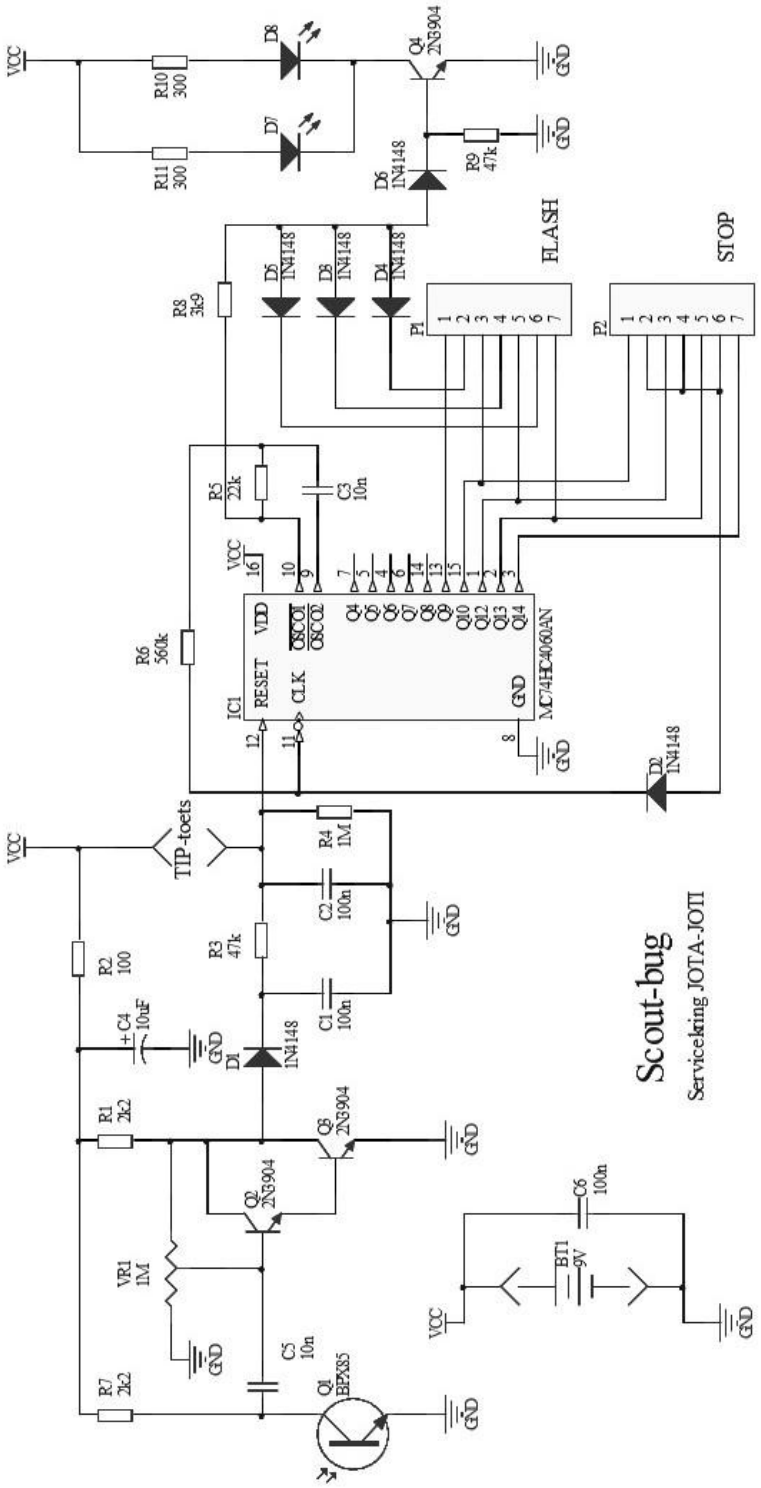
Schematic:



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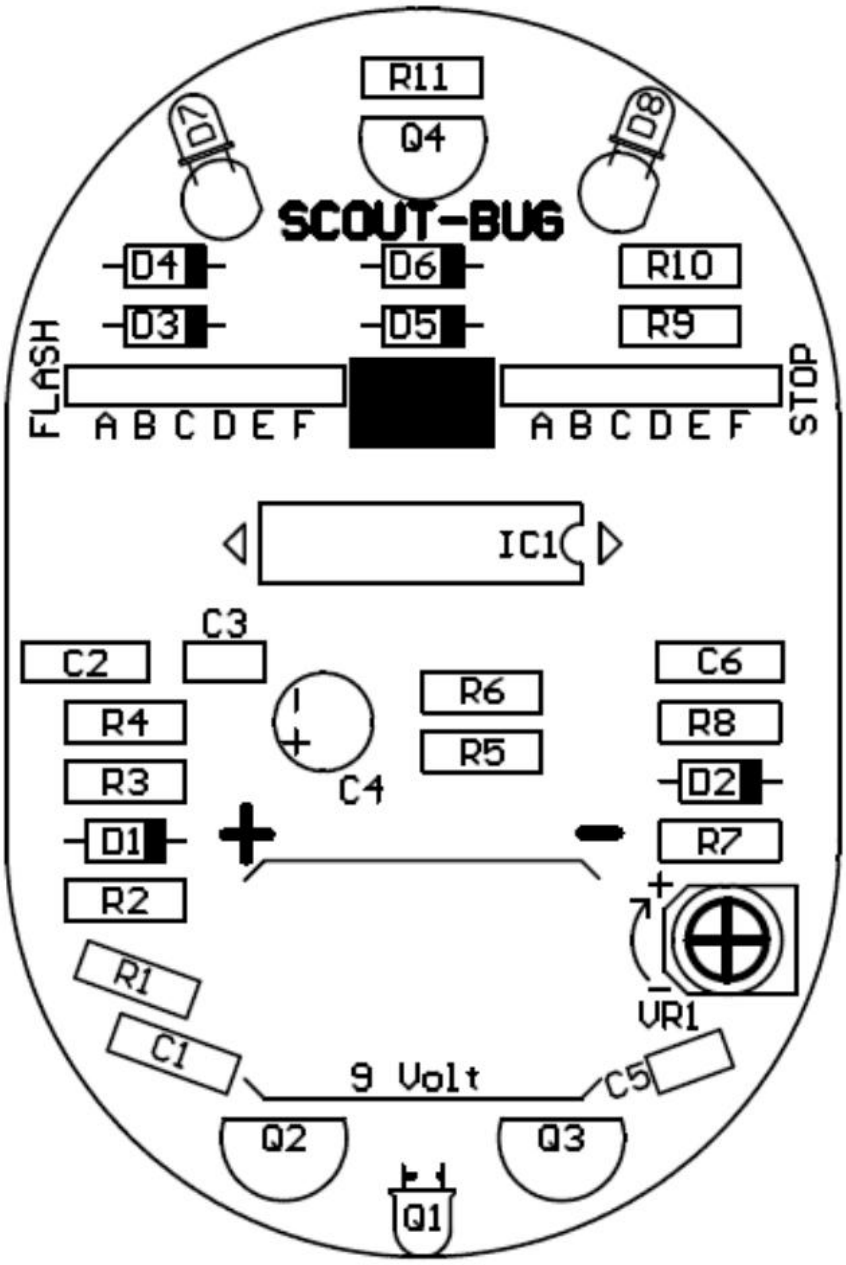
Components Setup:



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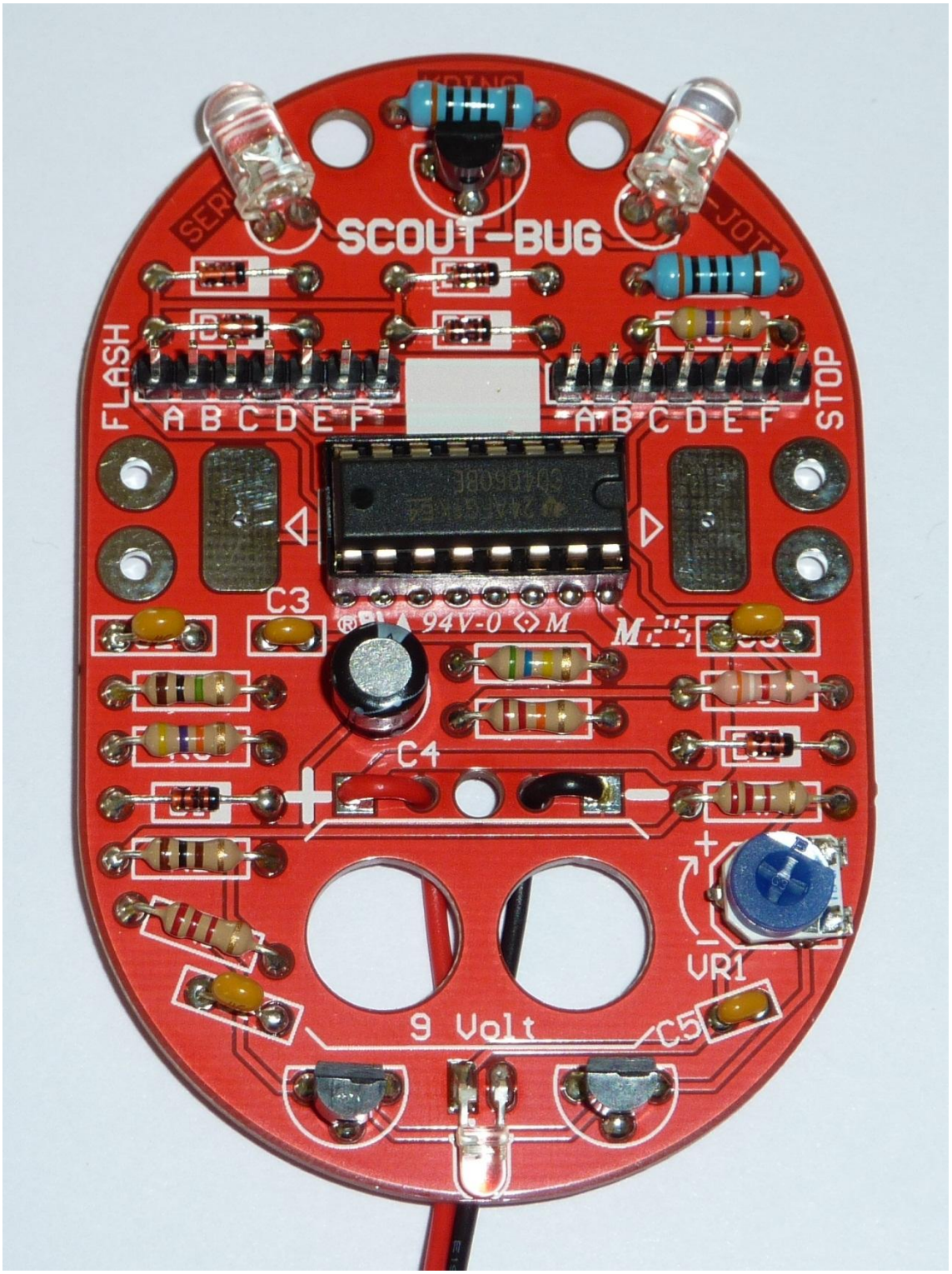
Completely built-up print board:



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Game Ideas:

Besides that the SCOUT-BUG is a fun and decorative structure, numerous games can be played wit it. We have already seen that the SCOUT-BUG reacts to light flashes, this may also flashes of a fellow Scout-Bug ! If the flash of a SCOUT-BUG is picked up by another it will also blink and then let perhaps trigger a third flash. This could provide nice light effects at a campfire. With the wings you can attach the SCOUT-BUG to your tie.

SCOUT BUG relay, take for example two groups, each with 3 SCOUT BUG's. When you line them up, The first BUG will set off the 2e BUG. The 2e Bug will set off the 3e Bug. When you quickly place the 1e BUG on the 4e position, the 3e BUG will set it off again, and so on. Who will cover the biggest distance?

SCOUT-BUG contest, who shall bridge the biggest distance with only 2 SCOUT-BUG's? How fare can you separate them so they will continue responding on the other SCOUT-BUG?

SCOUT-BUG robbery, robbery with SCOUT-BUG's as flags. Each group uses a flashlight or remote to let the opposite Scout-Bug reveal its position with his blinking. This is especially difficult because the SCOUT-BUG reacts to light flashes and not to continuous light from a flashlight.

SCOUT-BUG lightshow, use all the groups SCOUT-BUGS to create your spectacular lightshow.

SCOUT-BUG memory, Let the younger members search for a SCOUT-BUG with the same sequence.

SCOUT-BUG search, Let the younger members search for a SCOUT-BUG with a distinguished sequence, and perhaps tie a assignment to it .

SCOUT-BUG hike, Set up a trail for a adventurous trip and let the SCOUTS-BUGS tell the kids to go left, right, of strait ahead depending on the Bug sequence.

Do you have more brilliant game idea's? Please do tell us!

SCOUT-BUG 2012

Pimp your bug:

With the SCOUT-BUG we could do many more things than are described in this manual. For example we could mount the phototransistor Q1 and both LEDs D7 and D8 upright. Then the SCOUT-BUG will be more visible and respond sooner when placed upright of hangs on. The use of reflective tape can also help to improve.

Pimp your BUG contest:

Have you pimped the SCOUT-BUG, invented a unique application or game or made it into a fantastic light show? Let us know through photos, videos or anything else you can come up.
For the three best entries, the Service Kring JOTA-JOTI makes a nice price available!
The assessment of the submissions follows shortly after the JOTA JOTI, The deadline is 31 October 2012.

Feedback:

Are there any comments or feedback on the SCOUT-BUG?
Are there any comments or questions about the Service Kring JOTA-JOTI?
Please contact us via the contact form on the site www.kitbuilding.org.

Will you submit a contribution for the **Pimp your Bug contest**?
Do you want to show what you have done with the SCOUT-BUG?
Send you report , if possible with photos or videos, to: pimpmyscoutbug@kitbuilding.org

On behalf of the Service Kring JOTA-JOTI we wish everyone very much building fun but also lots of fun with the SCOUT-BUG!