

This is the Revision A version of the LED10 RoboBrick. The status of this project is that it has been replaced by the Revision B revision.

# Led10 Robobrick (Revision A)

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## 1. Introduction

The LED10 RoboBrick provides the ability to output 10 bits of data to 10 LED's on board.

A picture of an LED10–A RoboBrick is shown below:

## 2. Programming

The Led4 RoboBrick supports the standard shared commands in addition to the following commands:

Command	Send/Receive	Byte Value								Discussion
		7	6	5	4	3	2	1	0	
Write Lower	Send	0	0	0	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	Write <i>fghij</i> out to the lower 5 LED's.
Write Upper	Send	0	0	1	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	Write <i>abcde</i> out to the upper 5 LED's.
Bit Clear	Send	0	1	0	0	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Turn LED <i>bbbb</i> off. MSB ( <i>bbbb</i> =1010) LSB ( <i>bbbb</i> =0000)
Bit Set	Send	0	1	0	1	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Turn LED <i>bbbb</i> on.
Bit Toggle	Send	0	1	1	0	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Toggle LED <i>bbbb</i> .
Bit Read	Send	0	1	1	1	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Read status of LED <i>bb</i> .
	Receive	<i>r</i>	<i>r</i>	<i>r</i>	0	0	0	0	<i>b</i>	LED state is <i>b</i> . Blink rate is <i>rrr</i>
Read All	Send	1	0	0	0	0	0	0	0	Read all ten LED's.
	Receive	0	0	0	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	Upper five LED state is <i>abcde</i>
	Receive	0	0	0	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	Lower five LED state is <i>fghij</i>

## LED10 RoboBrick (Revision A)

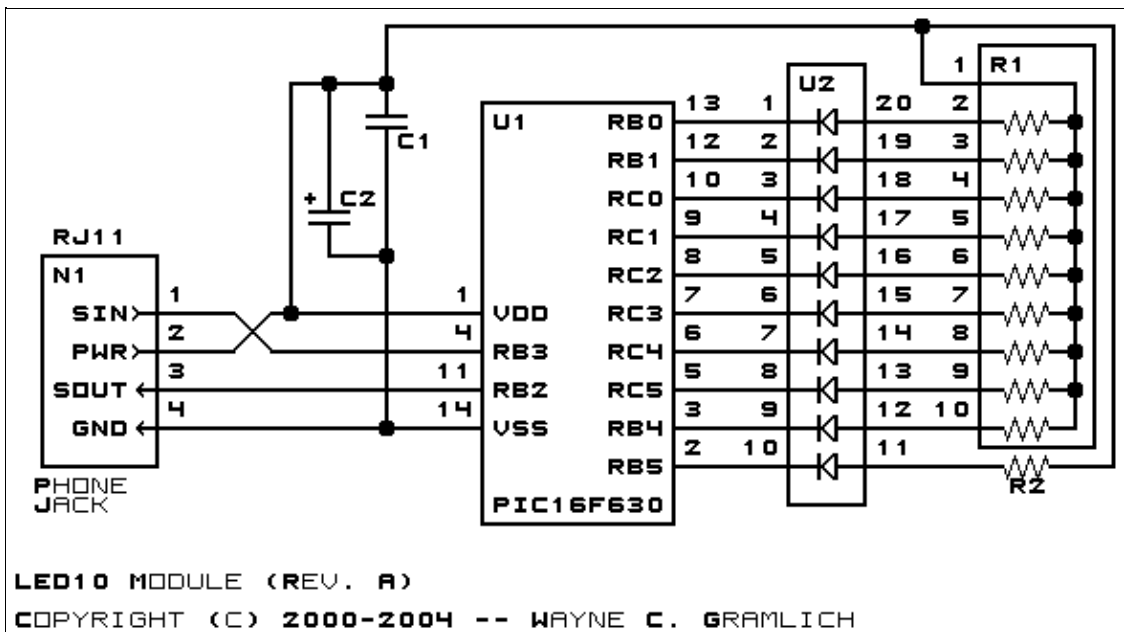
Read Lower	Send	1	0	0	0	0	0	0	1	Read lower five LED's.
	Receive	0	0	0	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	Lower five LED state is <i>fg hij</i>
Read Upper	Send	1	0	0	0	0	0	1	0	Read upper five LED's.
	Receive	0	0	0	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	Upper five LED state is <i>abcde</i>
Blink Rate Set	Send	1	0	0	0	0	0	1	1	Set Blink Rate
	Send	<i>r</i>	<i>r</i>	<i>r</i>	0	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Set LED <i>bbbb</i> blink rate to <i>rrr</i> . On ( <i>rrr</i> =000) Slow ( <i>rrr</i> =001) Medium( <i>rrr</i> =100) Fast ( <i>rrr</i> =111)
Increment LED's	Send	1	0	0	1	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Increment LED's starting at bit <i>bbbb</i>
Decrement LED's	Send	1	0	1	0	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Decrement LED's starting at bit <i>bbbb</i>
Power Level Mode	Send	1	0	1	1	<i>l</i>	<i>l</i>	<i>l</i>	<i>l</i>	Set LED's to power level <i>llll</i> ; All off ( <i>llll</i> =000), All on ( <i>llll</i> >=1010)
<u>Shared Commands</u>	Send	1	1	1	1	<i>a</i>	<i>b</i>	<i>c</i>		Send shared command <i>abc</i> to RoboBrick.

## 3. Hardware

The hardware consists of a circuit schematic and a printed circuit board.

### 3.1 Circuit Schematic

The schematic for the Led10 RoboBrick is shown below:



The parts list kept in a separate file -- [led10.ptl](#).

## 3.2 Printed Circuit Board

The printed circuit board files are listed below:

[led10\\_back.png](#)

The solder side layer.

[led10\\_front.png](#)

The component side layer.

[led10\\_artwork.png](#)

The artwork layer.

[led10.gbl](#)

The RS-274X "Gerber" back (solder side) layer.

[led10.gtl](#)

The RS-274X "Gerber" top (component side) layer.

[led10.gal](#)

The RS-274X "Gerber" artwork layer.

[led10.drl](#)

The "Excellon" NC drill file.

[led10.tol](#)

The "Excellon" tool rack file.

## 4. Software

The Led10 software is available as one of:

[led10.ucl](#)

The  $\mu$ CL source file.

[led10.asm](#)

The resulting human readable PIC assembly file.

[led10.lst](#)

The resulting human readable PIC listing file.

[led10.hex](#)

The resulting Intel<sup>®</sup> Hex file.

## 5. Issues

The following issues have come up:

- Change RJ11 connector.
- Think about reversing the wires to the LED's.
- Remove the capacitor.
- Label the LED's in copper lettering. LED0 is on the right and LED9 is on the left.

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