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 The status of this project is that it has been replaced by the Revision C revision.

Led10 Robobrick (Revision B)

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This document is also available in PDF format.

1. Introduction

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

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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	*f*	*g*	*h*	*i*	*j*	Write *fghij* out to the lower 5 LED's.
Write Upper	Send	0	0	1	*a*	*b*	*c*	*d*	*e*	Write *abcde* out to the upper 5 LED's.
Bit Clear	Send	0	1	0	0	*b*	*b*	*b*	*b*	Turn LED *bbbb* off. MSB (*bbbb*=1001) LSB (*bbbb*=0000)
Bit Set	Send	0	1	0	1	*b*	*b*	*b*	*b*	Turn LED *bbbb* on.
Bit Toggle	Send	0	1	1	0	*b*	*b*	*b*	*b*	Toggle LED *bbbb*.
Bit Read	Send	0	1	1	1	*b*	*b*	*b*	*b*	Read status of LED *bb*.
	Receive	*r*	*r*	*r*	0	0	0	0	*b*	LED state is *b*. Blink rate is *rrr*
Read All	Send	1	0	0	0	0	0	0	0	Read all ten LED's.
	Receive	0	0	0	*a*	*b*	*c*	*d*	*e*	Upper five LED state is *abcde*
	Receive	0	0	0	*f*	*g*	*h*	*i*	*j*	Lower five LED state is *fghij*
Read Lower	Send	1	0	0	0	0	0	0	1	Read lower five LED's.

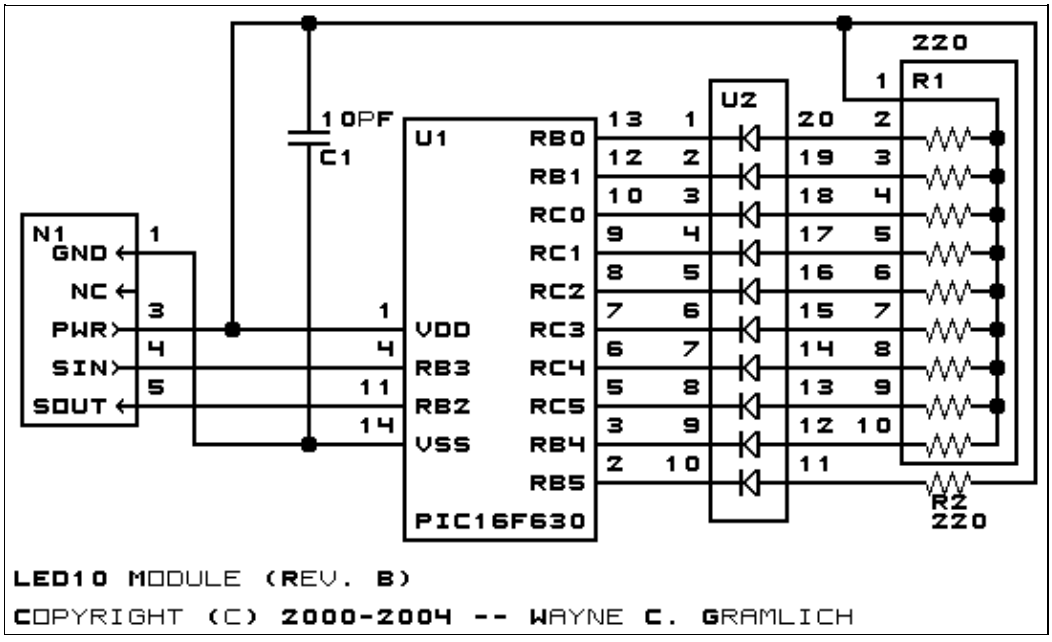
	Receive	0	0	0	*f*	*g*	*h*	*i*	*j*	Lower five LED state is *fghij*
Read Upper	Send	1	0	0	0	0	0	1	0	Read upper five LED's.
	Receive	0	0	0	*a*	*b*	*c*	*d*	*e*	Upper five LED state is *abcde*
Blink Rate Set	Send	1	0	0	0	0	0	1	1	Set Blink Rate
	Send	r	r	r	0	b	b	b	b	Set LED *bbbb* blink rate to *rrr*. On (*rrr*=000)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

5. Issues

The following fabrication issues came up:

- The holes for N1 are too large (size 3) and need to be made smaller (size 2.)
- R1 should be set up so that it can take individual resistors as well.
- The diodes in U2 actually point the other way. Thus, the wires between pin 1 and 20, 2 and 19, ... , 10 and 11 need to be swapped.
