

This is the Revision A version of the [Out10 RoboBrick](#). The status of this project is that it has been [replaced](#) by the [InOut10 RoboBrick](#).

Out10 Robobrick (Revision A)

Table of Contents

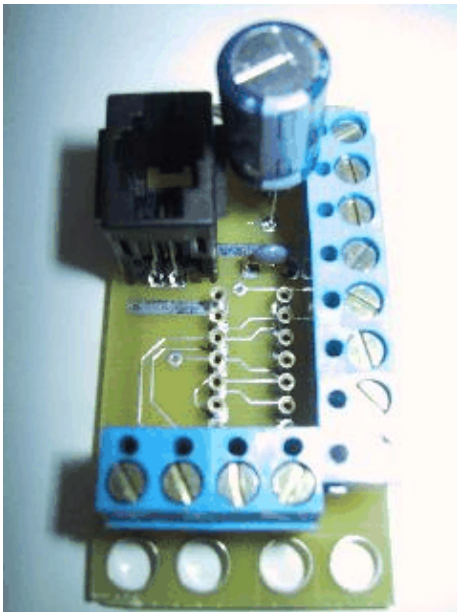
This document is also available in [PDF](#) format.

- [1. Introduction](#)
- [2. Programming](#)
- [3. Hardware](#)
 - ◆ [3.1 Circuit Schematic](#)
 - ◆ [3.2 Printed Circuit Board](#)
- [4. Software](#)
- [5. Issues](#)

1. Introduction

The Out10 RoboBrick provides the ability to output 10 bits of data.

A picture of an Out10–A RoboBrick is shown below:



2. Programming

The Out10 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	

Out10 RoboBrick (Revision A)

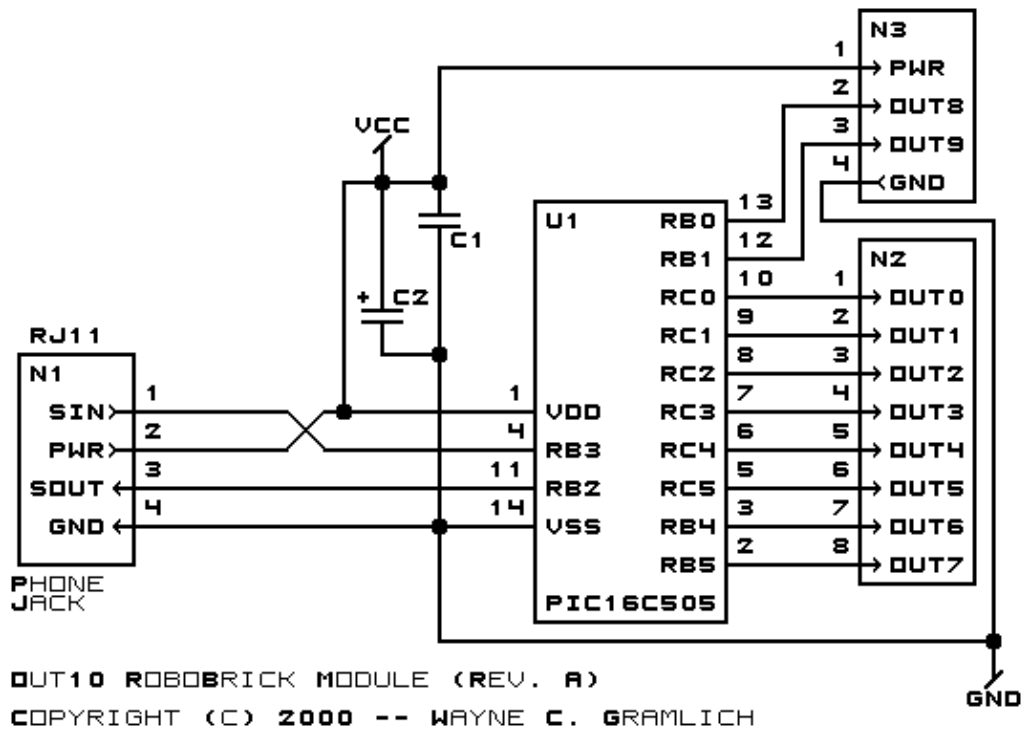
Write Lower	Send	0	0	0	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	Write <i>fghij</i> out to the lower 5 bits.
Write Upper	Send	0	0	1	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	Write <i>abcde</i> out to the upper 5 bits.
Bit Clear	Send	0	1	0	0	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Turn bit <i>bbbb</i> 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 bit <i>bbbb</i> on.
Bit Toggle	Send	0	1	1	0	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Toggle bit <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 bit <i>bbbb</i> .
	Receive	0	0	0	0	0	0	0	<i>b</i>	Bit state is <i>b</i> .
Read All	Send	1	0	0	0	0	0	0	0	Read all ten bits.
	Receive	0	0	0	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	Upper five bits <i>abcde</i>
	Receive	0	0	0	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	Lower five bits <i>fghij</i>
Read Lower	Send	1	0	0	0	0	0	0	1	Read lower five bits.
	Receive	0	0	0	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	Lower five bits are <i>fghij</i>
Read Upper	Send	1	0	0	0	0	0	1	0	Read upper five bits.
	Receive	0	0	0	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	Upper five bits are <i>abcde</i>
Increment Bits	Send	1	0	0	1	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Increment bits starting at bit <i>bbbb</i>
Decrement Bits	Send	1	0	1	0	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	Decrement bits starting at bit <i>bbbb</i>
Shared Commands	Send	1	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 Out10 RoboBrick is shown below:



The parts list kept in a separate file -- [out10.ptl](#).

3.2 Printed Circuit Board

The printed circuit files are listed below:

[out10_back.png](#)

The solder side layer.

[out10_front.png](#)

The component side layer.

[out10_artwork.png](#)

The artwork layer.

[out10.gbl](#)

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

[out10.gtl](#)

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

[out10.gal](#)

The RS-274X "Gerber" artwork layer.

[out10.drl](#)

The "Excellon" NC drill file.

[out10.tol](#)

The "Excellon" tool rack file.

4. Software

The Out10 software is available as one of:

[out10.ucl](#)

The μ CL source file.

[out10.asm](#)

The resulting human readable PIC assembly file.

[out10.lst](#)

The resulting human readable PIC listing file.

[out10.hex](#)

The resulting Intel[®] Hex file that can be fed into a PIC12C5xx programmer.

The Out10 test suite is available as one of:

[out10_test.ucl](#)

The μ CL source file.

[out10_test.asm](#)

The resulting human readable PIC assembly file.

[out10_test.lst](#)

The resulting human readable PIC listing file.

[out10_test.hex](#)

The resulting Intel[®] Hex file that can be fed into a PIC16F84 programmer.

5. Issues

The following issues came up:

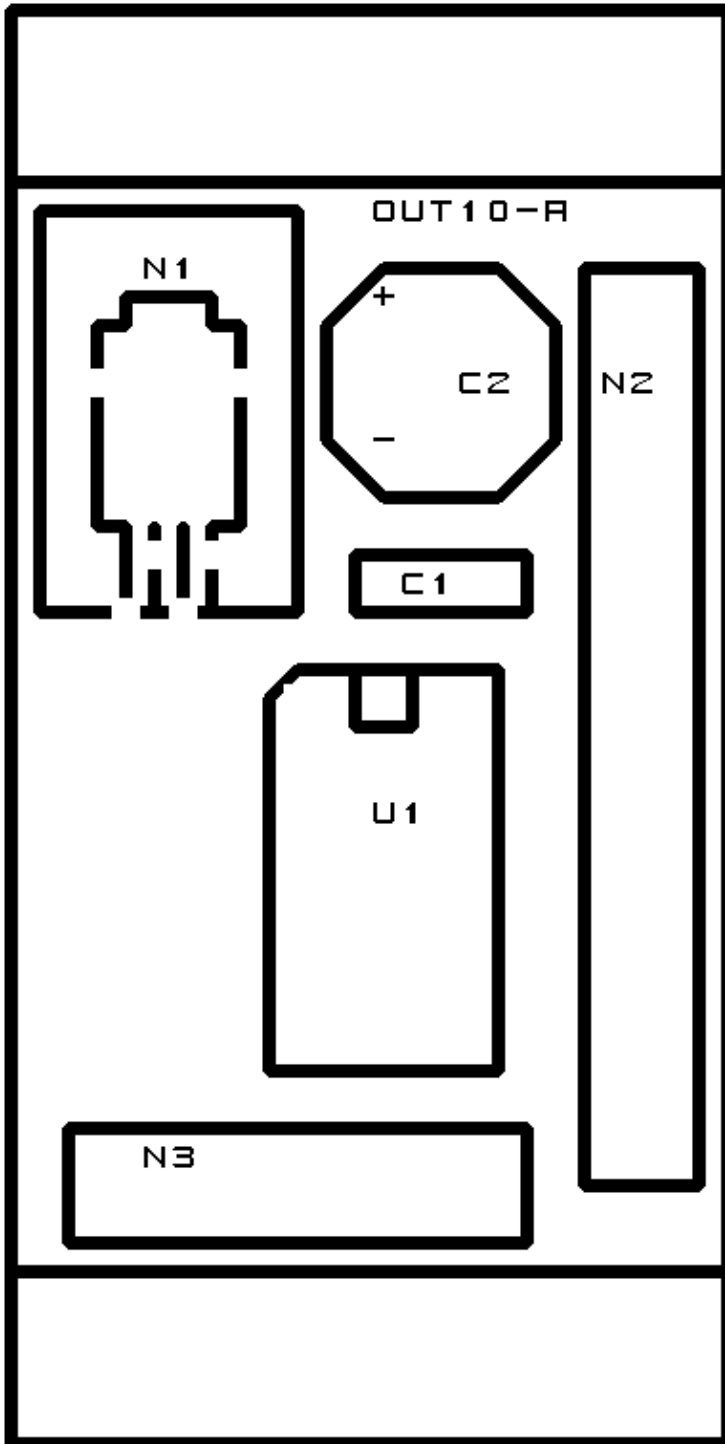
- Add labels to output pins in copper.
- Remove RJ11 connector.
- Remove capacitor.

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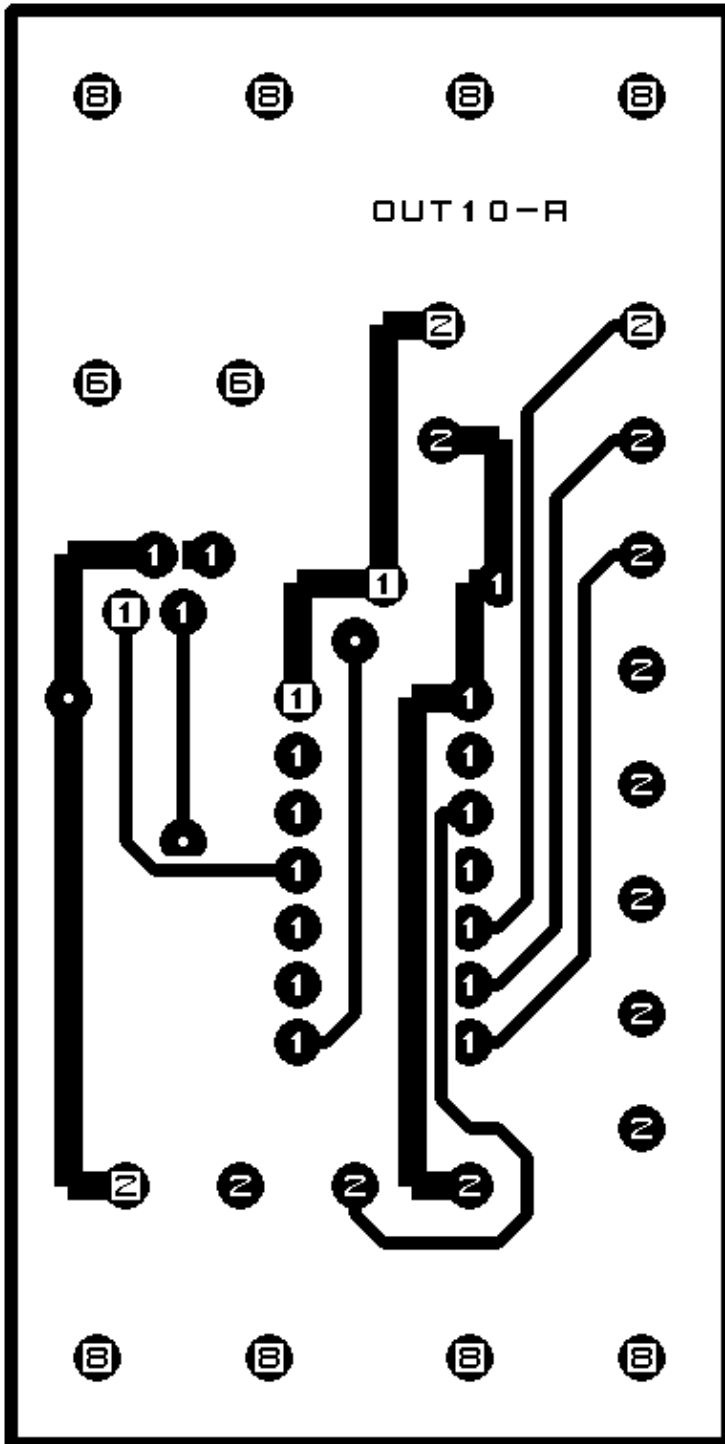
A. Appendix A: Parts List

```
# Parts list for Out10 RoboBrick (Rev. A)
#
C1: Capacitor10pF - 10 pF Ceramic Capacitor [Jameco: 15333]
C2: Capacitor2200uF - 2200 uF 6.3V Electrolytic Capacitor [Jameco: 133145]
N1: RJ11Female4_4.RBSlave - Female RJ11 (4-4) Phone Jack [Digikey: A9071-ND]
N2: TerminalStrip8.Out10 - 8 Junction Terminal Strip [4 Jameco: 189675]
N3: TerminalStrip4.Out10 - 4 Junction Terminal Strip [2 Jameco: 189675]
U1: PIC16C505.Out10 - Microchip PIC16C505 [Digikey: PIC16C505-04/P-ND]
```

B. Appendix B: Artwork Layer



C. Appendix C: Back (Solder Side) Layer



D. Appendix D: Front (Component Side) Layer

