

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

Harness Robobrick (Revision B)

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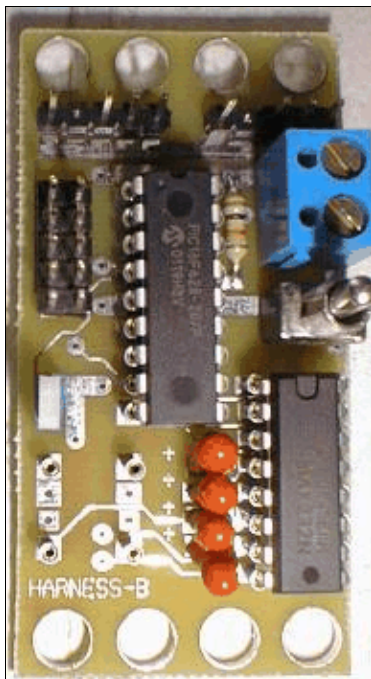
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1. Introduction

The Harness RoboBrick is used to test a [RoboBrick](#) network. It is built using a PIC16F84 microcontroller from [MicroChip](#). The PIC16F84 is used so that the software can easily be changed for testing purposes. Either a dumb terminal or a terminal emulator is connected to the Harness RoboBrick via a [Tether](#) RoboBrick. Communication occurs at 2400 baud.

A picture of Harness-B is shown below (without the crystal):



2. Programming

The Harness commands are summarized as follows:

Ns

Send a single byte containing *N* (where *N* is an octal number) to the RoboBrick. Do not wait for any reply bytes.

Nw

Send a single byte containing *N* (where *N* is an octal number) to the RoboBrick. The program waits for up to 5 response bytes. If no byte is present, the byte 376 is returned. All returned bytes are printed as 3-digit octal numbers.

i

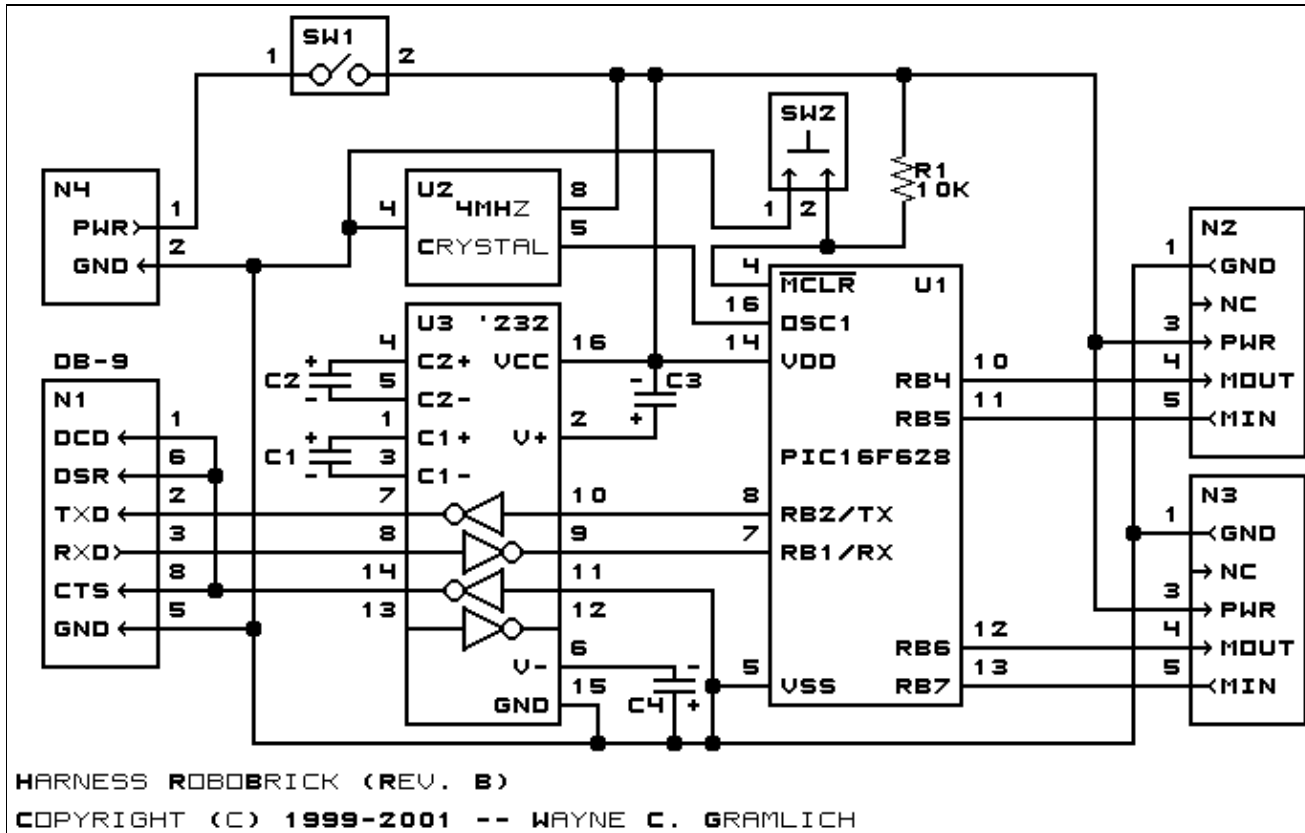
Interrogate the RoboBrick to find out its identification information.

3. Hardware

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

3.1 Circuit Schematic

The schematic for the Harness RoboBrick is shown below:



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

3.2 Printed Circuit Board

The printed circuit board files are listed below:

[harness_back.png](#)

The solder side layer.

[harness_front.png](#)

The component side layer.

[harness_artwork.png](#)

The artwork layer.

[harness.gbl](#)

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

[harness.gtl](#)

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

[harness.gal](#)

The RS-274X "Gerber" artwork layer.

[harness.drl](#)

The "Excellon" NC drill file.

[harness.tol](#)

The "Excellon" NC drill rack file.

4. Software

The Harness software is available as one of:

[harness.ucl](#)

The μ CL source file.

[harness.asm](#)

The resulting human readable PIC assembly file.

[harness.lst](#)

The resulting human readable PIC listing file.

[harness.hex](#)

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

5. Issues

The following fabrication issues came up:

- Make the holes of N1 and N2 (size 3) smaller (size 2).
- Put a 1 next pin one of the crystal.
- Think about making the holes of S1 (size 4) larger (size 5).
- Increase the spacing between the capacitors.
- Add a low pass filter capacitor for U1.
- This board needs to be layed out again! It is seriously bungled!
- Add a couple of heart beat LED's.
- Find a better reset button; or just leave a 2-pin male header.
- Add a power on LED.
- Add a pin 1 next to the DB9 connector.
- It is hard to insert and remove the PIC16F628; either switch over to in-circuit programming, or move

the chip to one edge.

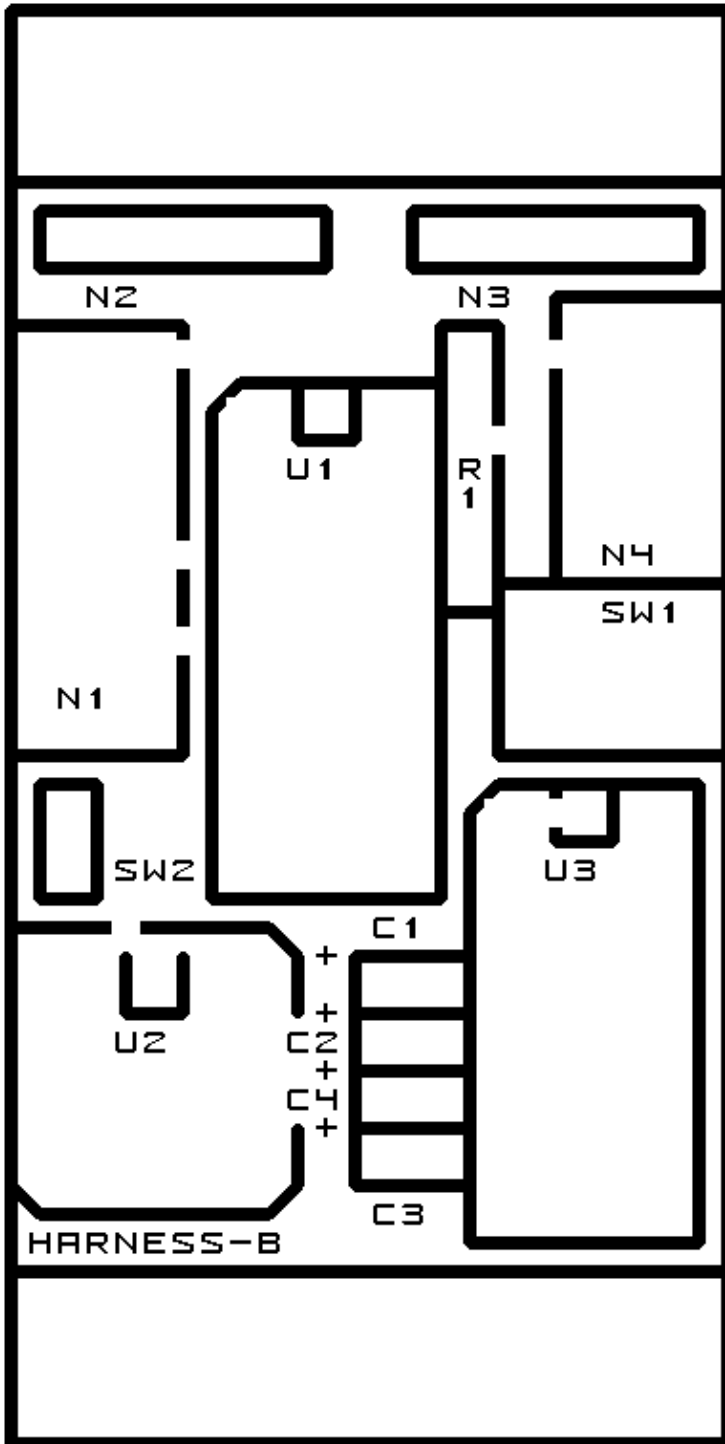
- The crystal can is grounded; be careful not to push the crystal all the way in, or it might ground either the power or signal wire. Use crystals with longer leads.

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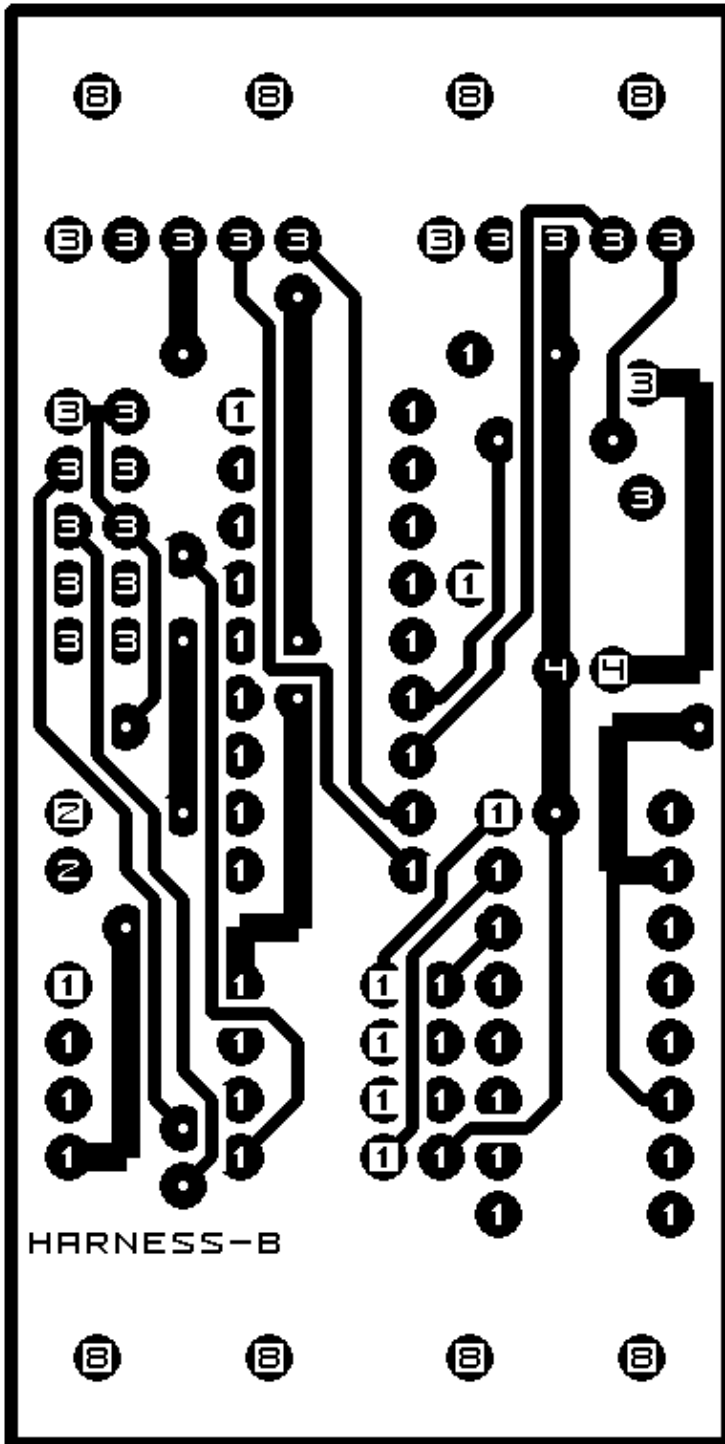
A. Appendix A: Parts List

```
# Parts list for Harness RoboBrick (Rev. B)
#
C1-4: Capacitor100nFNarrow - 100 nF (.1 uF) Tantalum Capacitor [Jameco: 33662]
C5: Capacitor10pF - 10 pF Ceramic Capacitor [Jameco: 15333]
N1: Header2x5.DB9 - 2x5 Header [10/80 Jameco: 117196]
N2-3: Header1x5.RBMaster - 1x5 Male Header [5/40 Jameco: 160881]
N4: TerminalStrip2.Harness - 2 Junction Terminal Strip [Jameco: 189675]
R1: Resistor10K - 10K Ohm 1/4 Watt Resistor [Jameco: 29911]
SW1: SwitchSPST - SPST Power Switch [Jameco: 72160]
SW2: SwitchPlunger - Small Plunger Switch [Jameco: 172700]
U1: PIC16F628.Harness - MicroChip Microcontroller [Digikey: PIC16F628-20/P-ND]
U2: Oscillator20MHzHalf - 20 MHz Crystal Oscillator [Digikey: X220-ND]
U3: MAX232CPE - RS-232 Level converter [Jameco: 24811]
```

B. Appendix B: Artwork Layer



C. Appendix C: Back (Solder Side) Layer



D. Appendix D: Front (Component Side) Layer

