This is the Revision A version of the SonarDT1 RoboBrick. The status of this project is that it has been replaced by the revison B version.

SonarDT1 Robobrick (Revision A)

Table of Contents

This document is also available as a PDF document.

1. Introduction

The Sonar1 RoboBrick is used to provide a RoboBrick interface to the SRF04 sonar range finder from Devantech.

2. Programming

The SonarDT1 RoboBrick is focused on operating the Devantech SRF04. In addition, it has the ability to control 1 servo, so that the SonarDT1 RoboBrick can be mounted on a standard hobby servo as a scanning platform. Lastly, there are some LED's that can provide direct feedback on the current distance being measured by the SRF04.

The SonarDT1 commands are summarized in the table below:

Command	Send/ Receive	Byte Value								Discussion
		7	6	5	4	3	2	1	0	
Read Distance Low	Send	0	0	0	0	0	0	0	0	Return the low order byte *llllllll* of the distance
	Receive	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	
Read Distance High	Send	0	0	0	0	0	0	0	1	Return the high order byte *hhhhhhhh* of the distance
	Receive	*h*	*h*	*h*	*h*	*h*	*h*	*h*	*h*	
Read Distance High and Low	Send	0	0	0	0	0	0	1	0	Return the low and high order bytes *llllllll hhhhhhhh* of the distance
	Receive	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	
	Receive	*h*	*h*	*h*	*h*	*h*	*h*	*h*	*h*	
Trigger Distance Measure	Send	0	0	0	0	0	0	1	1	Trigger a Single Distance Measurement
Disable Servo	Send	0	0	0	0	0	1	0	0	Disable Servo
Enable Servo	Send	0	0	0	0	0	1	0	1	Enable Servo
Disable Continuous	Send	0	0	0	0	0	1	1	0	Disable Continuous Measurement

Measurement										
Enable Continuous Measurement	Send	0	0	0	0	0	1	1	1	Enable Continuous Measurement
Increment Servo	Send	0	0	0	0	1	0	0	0	Increment servo position by one.
Decrement Servo	Send	0	0	0	0	1	0	0	1	Decrement servo positon by one.
Read Servo	Send	0	0	0	0	1	0	1	0	Return servo value *ssssssss* of the distance
	Receive	*s*	*s*	*s*	*s*	*s*	*s*	*s*	*s*	
Read Enables	Send	0	0	0	0	1	0	1	1	Return servo enable *s* and continuous distance measurement *m*
	Receive	0	0	0	0	0	0	*m*	*s*	
Set Servo Low	Send	0	0	0	1	*l*	*l*	*l*	*l*	Set the low order 4 bits of the servo position to *llll*.
Set Servo High	Send	0	0	1	0	*h*	*h*	*h*	*h*	Set the high order 4 bits of the servo position to *hhhh*.
Shared Commands	Send	1	1	1	1	1	*c*	*c*	*c*	Execute shared command *ccc*.

3. Hardware

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

3.1 Circuit Schematic

The schematic for the Sonar1 RoboBrick is shown below:
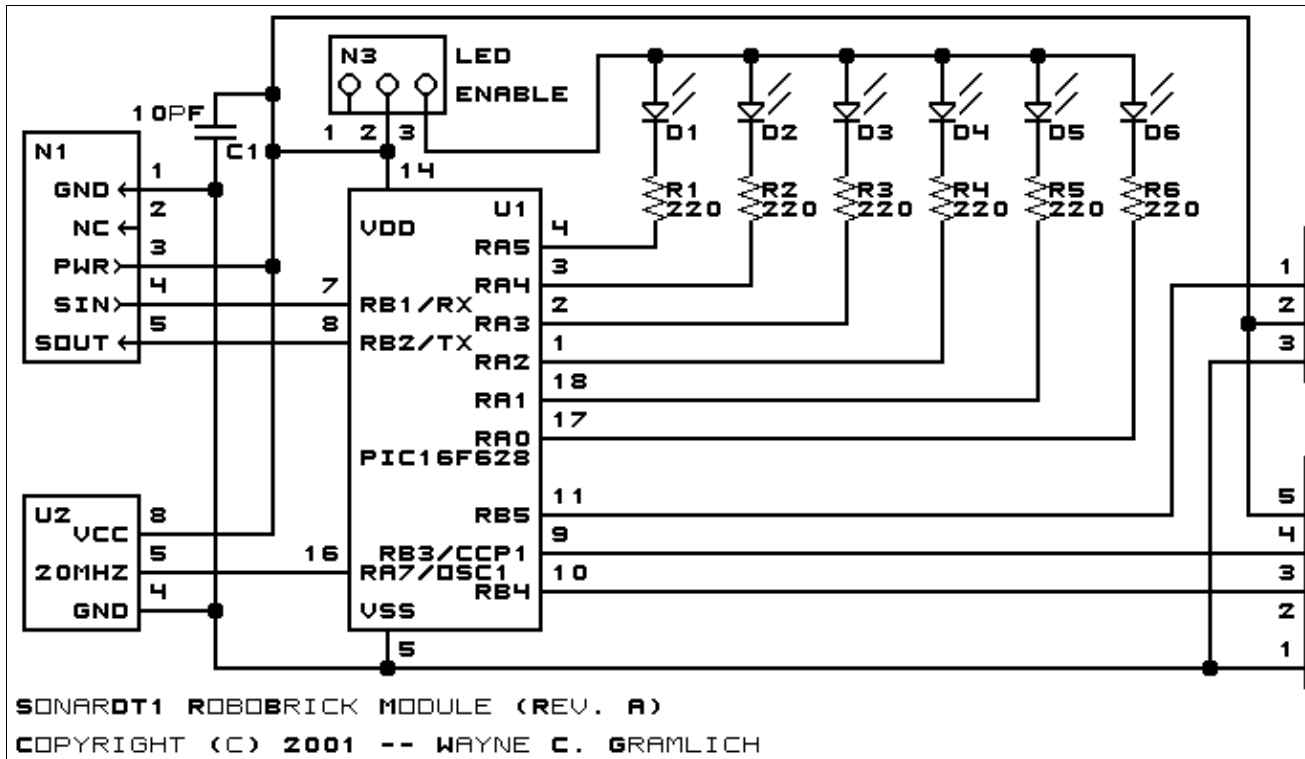
The parts list kept in a separate file –– sonardt1.ptl.

3.2 Printed Circuit Board

The printed circuit board files are listed below:

sonardt1_back.png
> The solder side layer.

sonardt1_front.png
> The component side layer.

sonardt1_artwork.png
> The artwork layer.

sonardt1.gbl
> The RS−274X "Gerber" back (solder side) layer.

sonardt1.gtl
> The RS−274X "Gerber" top (component side) layer.

sonardt1.gal
> The RS−274X "Gerber" artwork layer.

sonardt1.drl
> The "Excellon" NC drill file.

sonardt1.tol
> The "Excellon" tool rack file.

4. Software

The software for the SonarDT1 RoboBrick is in the following files:

sonardt1.ucl
> The μCL source code.

sonardt1.asm
> The PIC16F628 assembly code.

sonardt1.lst
> The listing file.

sonardt1.hex
> The Intel® hex file.

5. Issues

The following fabrication issues came up:

- Try and find 5−pin female connector vendor.
- Think about adding another LED to one of the unused pins.
- Think about adding an in−line programming capability!

A. Appendix A: Parts List

```
# Parts list for SonarDT1 RoboBrick (Rev. A)
#
C1: Capacitor10pF - 10pF Ceramic Capacitor [Jameco: 15333]
D1-6: LEDGreen - Green LED [Jameco: 34606]
R1-6: Resistor220 - 220 Ohm 1/4 Watt Resistor [Jameco: 30470]
N1: Header1x5.RBSlave - 1x5 Male Header [5/40 Jameco: 160881]
N2: Header1x5.SonarDT1 - 1x5 Female Header [5/40 Jameco: 160881]
N3: Header1x3.SonarDT1_LED - 1x3 Male Header [3/40 Jameco: 160881]
N4: Header1x3.SonarDT1_Servo - 1x3 Male Header [3/40 Jameco: 160881]
U1: PIC16F628.SonarDT1 - [Digikey: PIC16F628-20/P-ND]
U2: Oscillator20MHzHalf - Half Height 20MHz Oscillator [Digikey: X220-ND]
```

B. Appendix B: Artwork Layer
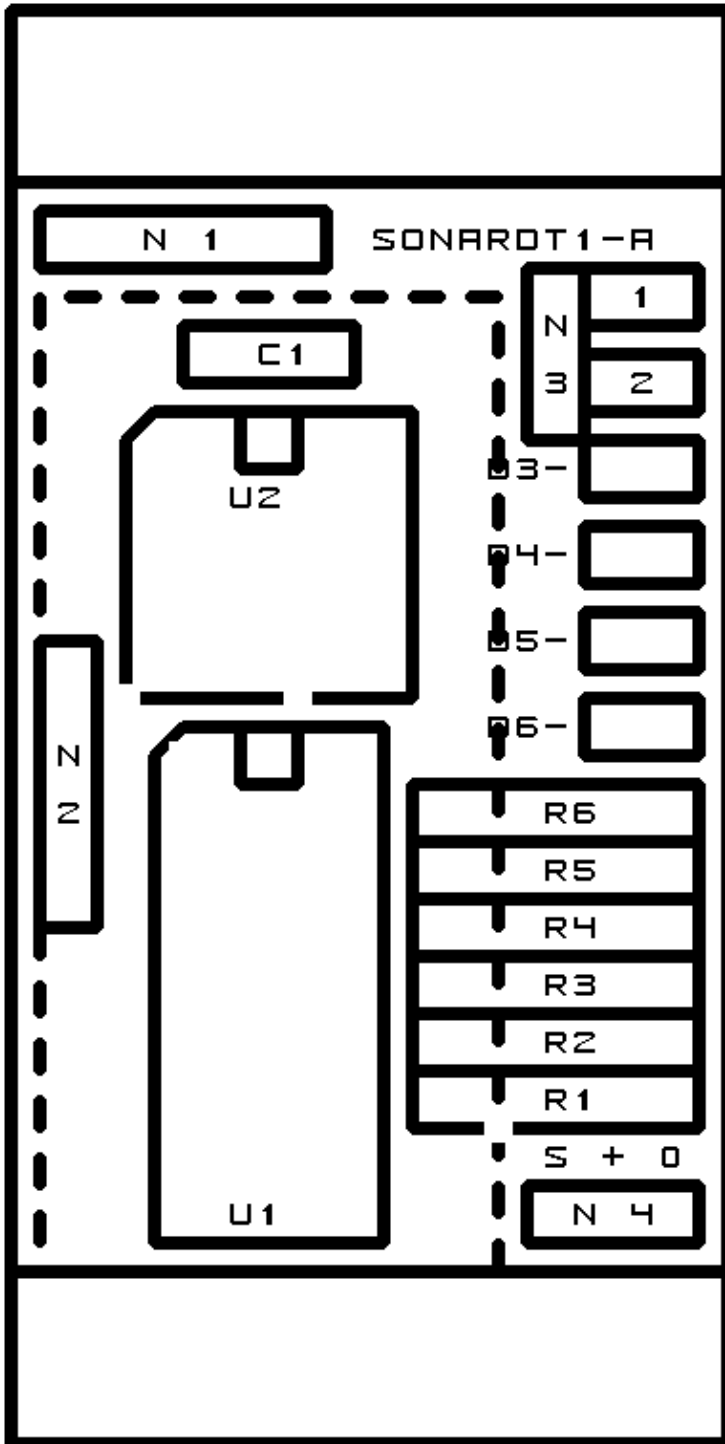
C. Appendix C: Back (Solder Side) Layer
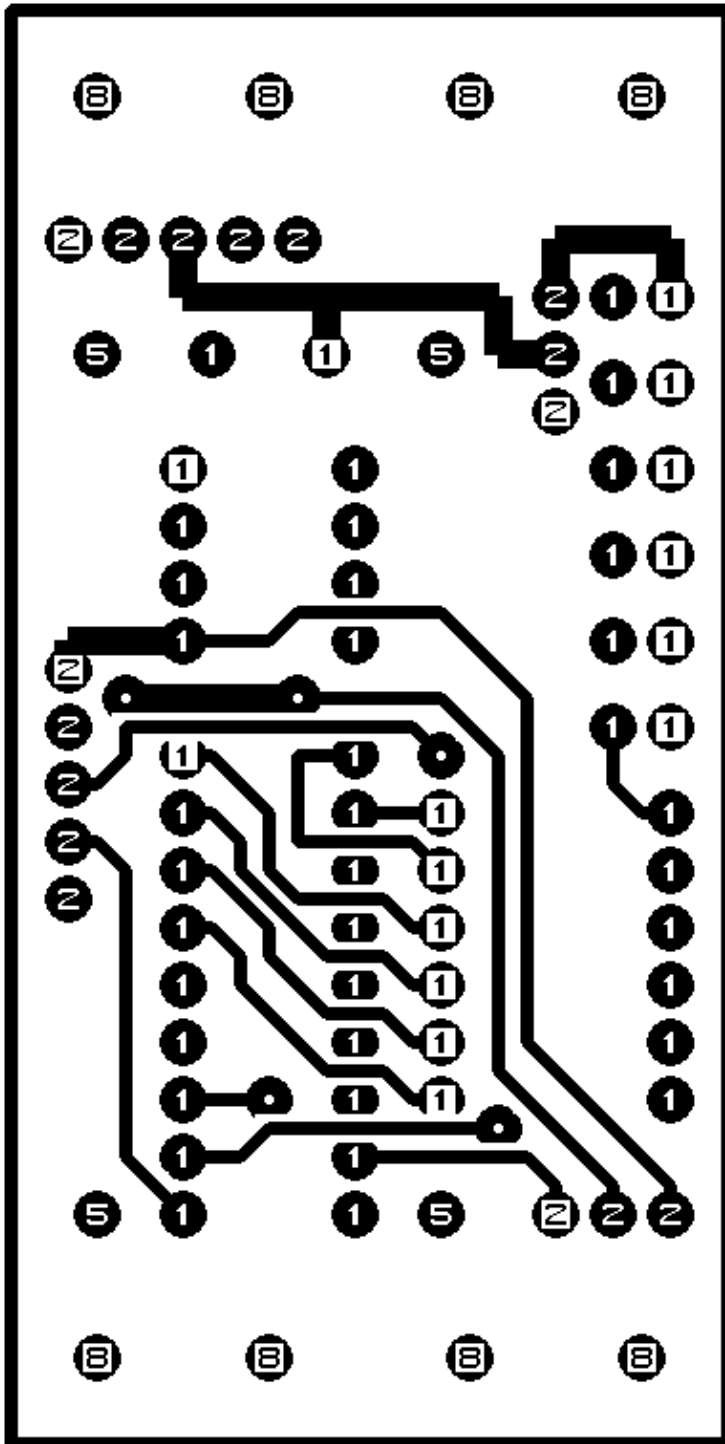
D. Appendix D: Front (Component Side) Layer