This is the Revision F version of the Servo4 module. The status of this project is finished.

Servo4 Module (Revision G)

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This document is also available as a PDF document.

1. Introduction

The Servo4 module allows for the control of up to 4 hobby grade servos.

2. Programming

The Servo4 module can independently control up to 4 servos. Each servo has 1) an enable bit and 2) a current position. The position is represented as an 8−bit number. Some experimentation is needed to determine how the 8−bit numbers correspond to actual servo positions. All servos are initialized to have the enable flags *off*.

The Servo4 commands are summarized in the table below:

Command	Send/ Receive	7	6	5	4	3	2	1	0	Discussion
Set High	Send	0	0	*h*	*h*	*h*	*h*	*s*	*s*	Set high order 4 bits of servo *ss* to *hhhh* and set the remaining 4 low order bits to zero.
Set Low	Send	0	1	*l*	*l*	*l*	*l*	*s*	*s*	Set the low order 4 bits of servo *ss* position to *llll*.
Increment	Send	1	0	0	*i*	*i*	*i*	*s*	*s*	Add *iii* to the position of servo *ss*.
Decrement	Send	1	0	1	*d*	*d*	*d*	*s*	*s*	Subtract *ddd* from the position of servo *ss*.
Set Position/Enable	Send	1	1	0	0	0	*e*	*s*	*s*	Select servo *ss* and set its position to *pppppppp* and enable flag to *e*.
	Send	*p*	*p*	*p*	*p*	*p*	*p*	*p*	*p*	
Set Enable Flag	Send	1	1	0	0	1	*e*	*s*	*s*	Select servo *ss* and set its enable flag to *e*.
Read Position	Send	1	1	0	1	0	0	*s*	*s*	Return the current position *pppppppp* for servo *ss*.
	Receive	*p*	*p*	*p*	*p*	*p*	*p*	*p*	*p*	
Read Enable	Send	1	1	0	1	0	1	*s*	*s*	Return the enable bit *e* for servo *ss*.
	Receive	0	0	0	0	0	0	0	*e*	
Read Enables	Send	1	1	0	1	1	0	0	0	Return the enable flags *eeee* for all four servos.
	Receive	0	0	0	0	*e*	*e*	*e*	*e*	

| Set Enables	Send	1	1	0	1	1	0	0	1	Set enable flags for all four servos to *eeee*.
	Send	0	0	0	0	*e*	*e*	*e*	*e*	
Shared Commands	Send	1	1	1	1	1	*c*	*c*	*c*	Execute shared command *ccc*.

The Servo4 module does *not* know the minimum and maximum extent for each servo. This has to be determined by experimentation.

3. Hardware

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

3.1 Circuit Schematic

The schematic for the Servo4 module is shown below:
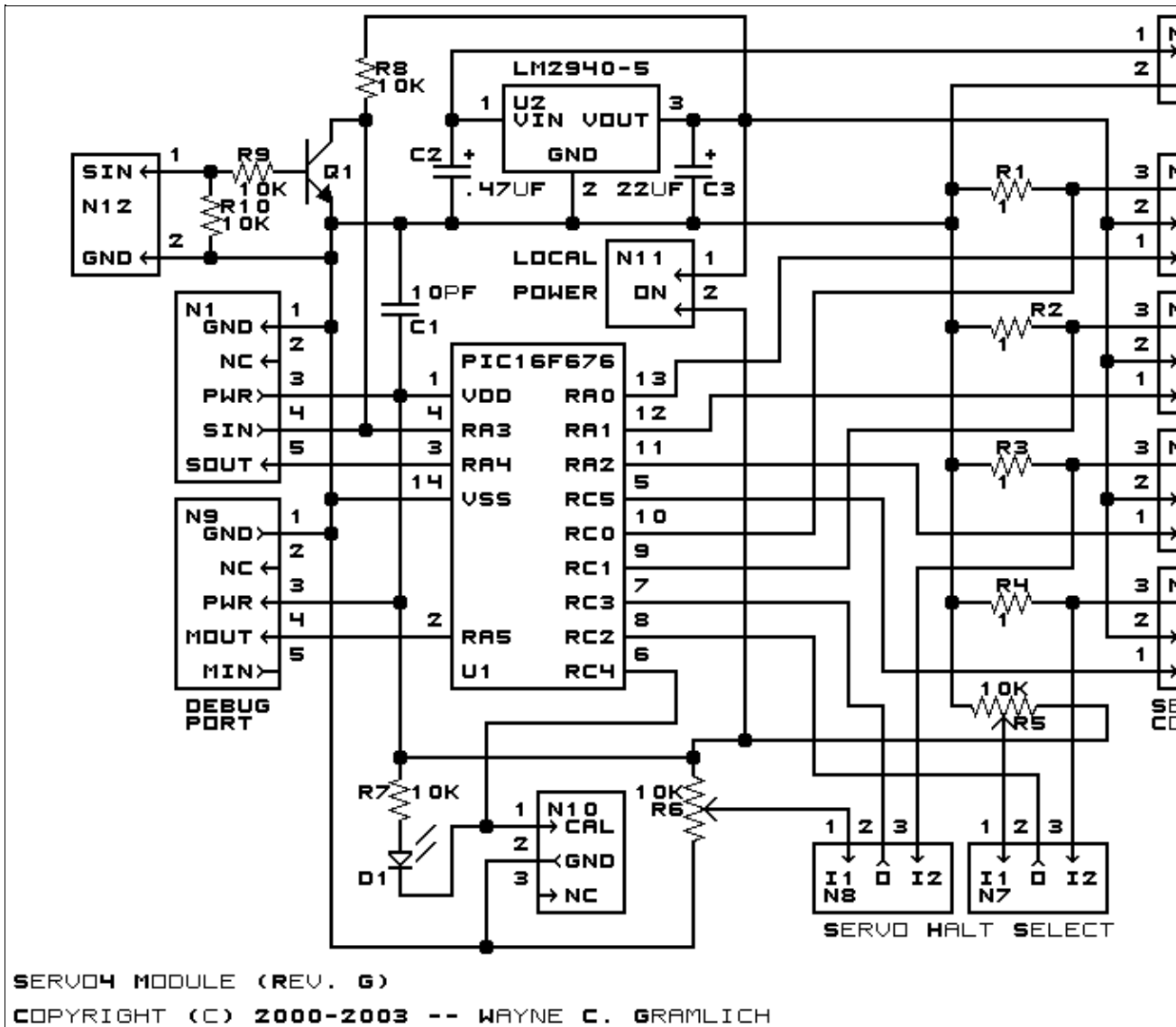
The parts list kept in a separate file –– servo4.ptl.

3.2 Printed Circuit Board

The printed circuit board files are listed below:

servo4_back.png
> The solder side layer is shown below:

servo4_front.png
> The component side layer is shown below:

servo4_artwork.png
> The artwork layer is shown below

servo4.gbl
> The RS−274X "Gerber" back (solder side) layer.

servo4.gtl
> The RS−274X "Gerber" top (component side) layer.

servo4.gal
> The RS−274X "Gerber" artwork layer.

servo4.drl
> The "Excellon" NC drill file.

servo4.tol
> The "Excellon" tool rack file.

4. Software

The Servo4 software is available as one of:

servo4.ucl
> The μCL source file.

servo4.asm
> The resulting human readable PIC assembly file.

servo4.lst
> The resulting human readable PIC listing file.

servo4.hex
> The resulting Intel® Hex file.

5. Issues

The following software issues have came up:

- There is a request for enhancement from William Hubbard for the ability to set "set points" and a command to "return to set point". Reasonable request; it might even fit.
- William Hubbard is requesting the ability to delay servo changes until a single command is sent. Reasonable request; it might be a tight fit.