This is the Revision A version of the Servo4 Module. The status of this project is that it has been replaced by the revision B revision.

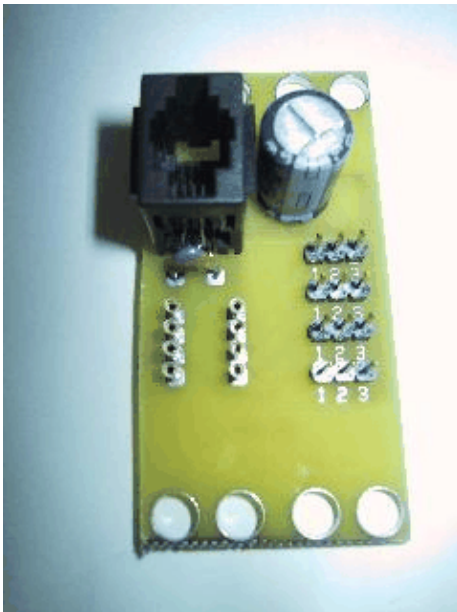# Servo4 Module (Revision A)

Table of Contents

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.

A picture of a Servo4–A Module is shown below:

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	Byte Value								Discussion
		7	6	5	4	3	2	1	0	
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 *ppppppp* 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.
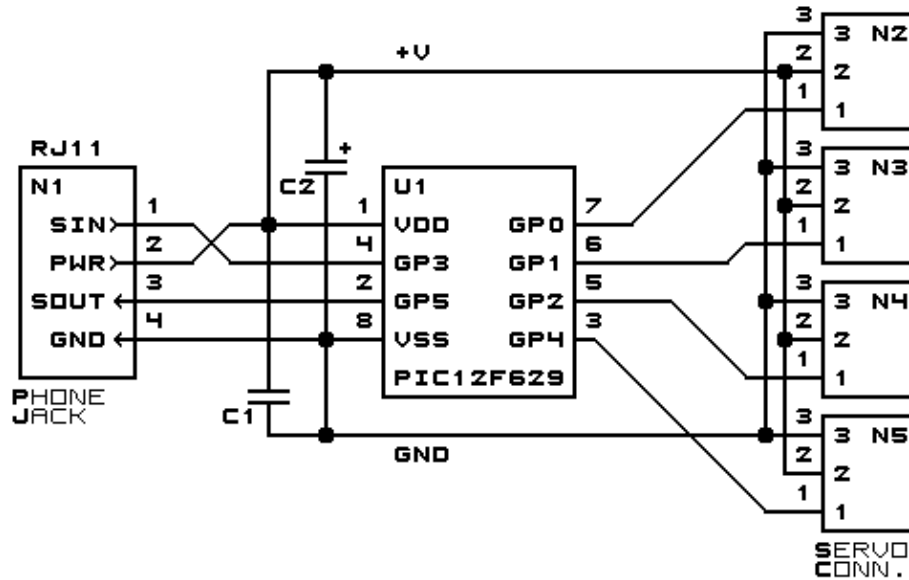
3. Hardware

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 that can be fed into a PIC12C5xx programmer.

5. Issues

- Provide better labels on the servo pins.