

WIZnet W5200 for QuickStart (#40002)

The WIZnet W5200 for QuickStart allows your QuickStart board to serve data to an Ethernet network or even the internet. The WIZnet W5200 chip provides an Ethernet to SPI bridge which is interfaced with Parallax's 8-core microcontroller, the Propeller P8X32A. The data served to a network can be anything you want – web pages, serial data, email, and more.

Many useful demo programs are available for download from the product page to get you started, including a webserver capable of serving dynamic data from the SD card to your favorite browser. Advanced users can develop firmware that allows the WIZnet W5200 board + QuickStart to respond to or generate any type of network traffic.



Features

- Prewritten drivers to support common network protocols such as TCP and UDP connections, HTTP, DHCP, DNS resolution, POP, SMTP, NetBIOS, and SNMP
- Prewritten demonstration programs, including a simple web server
- WIZnet W5200 TCP/IP 10BaseTX/100BaseTX Ethernet controller
- Micro SD card support
- I2C real time clock with super-cap battery backup
- Supports IEEE 802.3af PoE (Power over Ethernet) with a Silvertel Ag9050 daughterboard module (not included)
- Power may be supplied by your computer's USB port, onboard 2.1 mm barrel jack, or PoE
- Open Source Hardware

Specifications

- Power Requirements: 5–9 VDC, 300 mA max current draw, 175 mA typical current draw
- Communication Interface: SPI through the standard QuickStart header
- Operating temperature: -40 to +185 °F (-40 to +85 °C)
- Dimensions: 3 x 5 in (7.6 x 12.7 cm)

Application Ideas

- Webserver that serves dynamic sensor data
- Web-enabled home automation
- Remote weather monitor system
- Upgrade your Propeller board's firmware over the internet

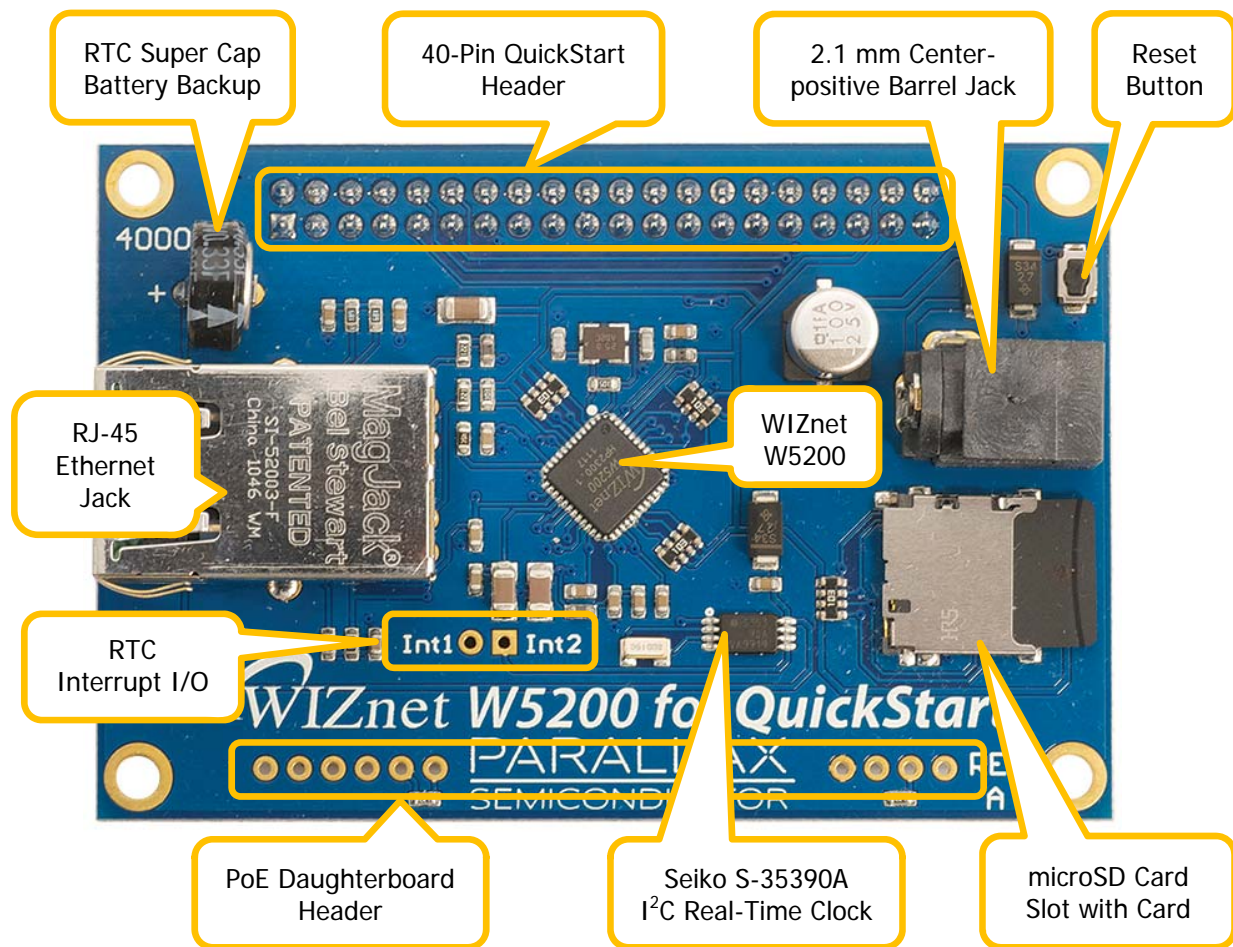
Kit Contents

- WIZnet 5200 for QuickStart PCB
- (4) Nylon M3 screws
- (4) Nylon M3 nuts
- (4) Nylon M3 standoffs
- (1) microSD card

Additional Items Required

- Home router (necessary for automatic configuration)
- CAT5 or greater Ethernet cable
- microSD card reader
- USB cable, male USB A to mini-B (Parallax #805-00006) or 7.5 Volt DC power supply with 2.1 mm barrel jack (Parallax #750-00009)
- Phillips #0 screwdriver and pliers for assembly

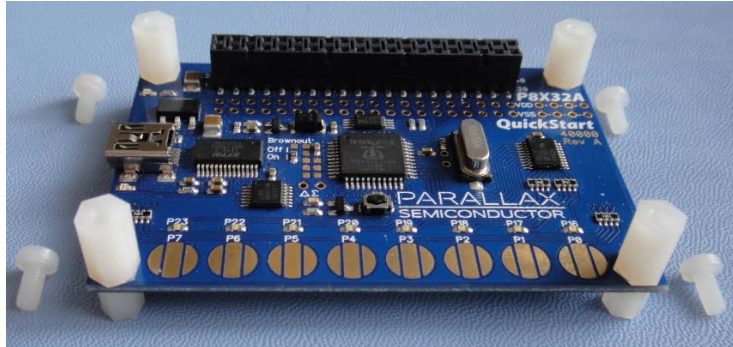
Board Features



Assembly Instructions



1. Place the four nylon M3 standoffs through the mounting holes on the top side of your QuickStart board and secure them in place on the bottom, each with a nylon M3 nut.



2. Carefully insert the WIZnet W5200 for QuickStart add-on board into the QuickStart header so that the add-on board covers the QuickStart board.

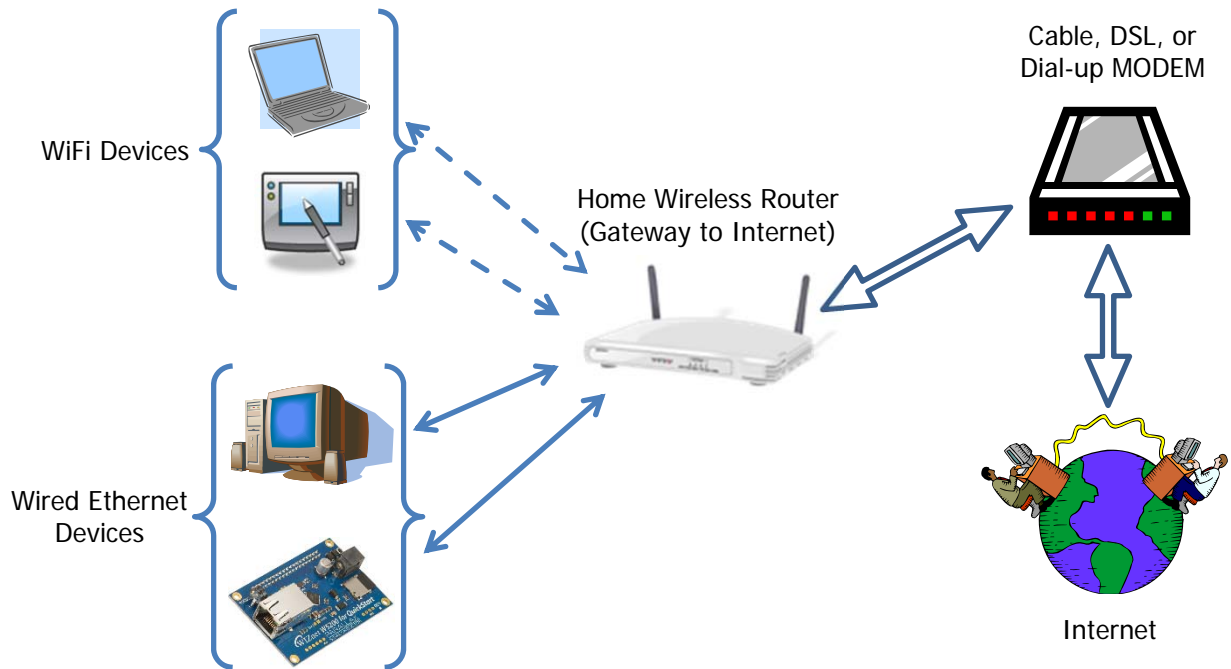


3. Secure the WIZnet W5200 board to the QuickStart board by screwing the included nylon M3 screws into the standoffs, through the WIZnet W5200 board's mounting holes. That's it!



Typical Home Network Configuration

Most home networks are configured like this:



Attach your QuickStart + W5200 board to your home wireless router as a wired Ethernet device.

Connections

Only a few connections are required to get your QuickStart + WIZnet W5200 board talking over Ethernet.

1. Once you have secured the W5200 board to your QuickStart board, connect a CAT 5 or greater Ethernet cable to the RJ-45 Ethernet jack on the left.
2. Attach the other end of the Ethernet cable to your home router, Ethernet switch, or other Ethernet device – as noted in the “Typical Home Network Configuration” section.
3. Next, power the system with one of the options, below.

That's it!

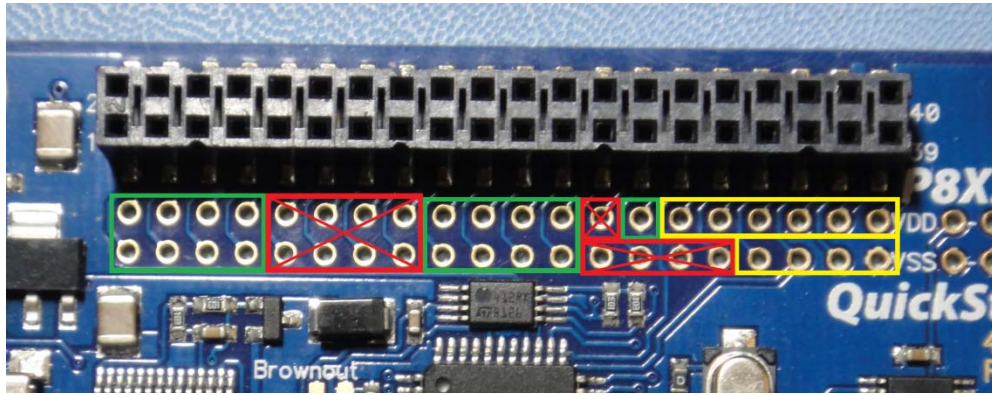
Power Supply Options

The QuickStart + WIZnet W5200 may be powered by any of these three options; it is safe to connect any combination of these at the same time:

- USB power via the Propeller QuickStart
- 6–9 VDC via 2.1 mm center-positive barrel jack
- Power over Ethernet with Silvertel Ag9050 daughter board (see page 6 for details).

Pin Usage and Description

There are 17 Propeller I/O pins available to interface additional peripherals to. The image below is of the QuickStart board's through-hole I/O pin header and details available I/O pins.



- Pins boxed in Green are available to you and can be used for any purpose.
- Pins boxed in Yellow are peripheral to the Propeller and generally will not be used.
- Pins boxed in Red are not available – they are used by the W5200 board.

Propeller IO Pin	QuickStart Header Pin	Pin Function	Description
P0	1	Available	
P1	2	Available	
P2	3	Available	
P3	4	Available	
P4	5	Available	
P5	6	Available	
P6	7	Available	
P7	8	Available	
P8	9	SD_Dout	W5200 SD Card SPI Dout Signal
P9	10	SD_Clk	W5200 SD Card SPI Clock Signal
P10	11	SD_Din	W5200 SD Card SPI Din Signal
P11	12	SD_CS	W5200 SD Card SPI Chip Select Signal
P12	13	Sclk	W5200 Chip SPI Clock Signal
P13	14	MiSo	W5200 Chip SPI Master In, Slave Out Signal
P14	15	MoSi	W5200 Chip SPI Master Out, Slave In Signal
P15	16	nSCS	W5200 Chip SPI Chip Select Signal
P16	17	Available	
P17	18	Available	
P18	19	Available	
P19	20	Available	
P20	21	Available	
P21	22	Available	

Propeller IO Pin	QuickStart Header Pin	Pin Function	Description
P22	23	Available	
P23	24	Available	
P24	25	PWDN	W5200 Chip Power Down/Sleep, Active High
P25	26	nINT	W5200 Chip Interrupt, Active Low
P26	27	nRST	W5200 Chip Hard Reset, Active Low
P27	28	Available	
P29	29	SDA	Propeller EEPROM I2C Data, W5200 RTC I2C Data
	30	USB_PWR_ENn	FTDI Enable USB Power, Active Low
P28	31	SCL	Propeller EEPROM I2C Clk, W5200 RTC I2C Clk
	32	XI	Crystal Input
P30	33	TX	Propeller TX
	34	RTSn	FTDI RTS Flow Control, Active Low
P31	35	RX	Propeller RX
	36	CTSn	FTDI CTS Flow Control, Active Low
	37	Resn	Propeller Reset, Active Low
	38	+3.3 V (Vdd)	3.3 volt power rail, 1 amp max (used by W5200)
	39	GND (Vss)	Ground reference
	40	Vin	Unregulated Voltage Input to QuickStart board

Power over Ethernet (PoE)

The QuickStart + W5200 board can optionally be powered over an Ethernet connection by a 3rd party daughter board, the Silvertel Ag9050. This PoE solution complies with the IEEE 802.3af standard for extracting power from Ethernet. In order for PoE to work, your physical network needs to have power injected into the transmission medium as per the standard's specification. The majority of networks do not natively support this feature as it requires the use of special hardware.



The header of 10 pins at the bottom of the WIZnet W5200 board, pictured above, is for use with the Silvertel Ag9050. To enable PoE, simply solder the Silvertel Ag9050 daughter board into this header. The daughter board can only be inserted one direction as the header is keyed by pin orientation. Once you have correctly attached the PoE daughterboard, your QuickStart + W5200 board can be powered and communicate through a single connection – the Ethernet cable.

Network Configuration Notice

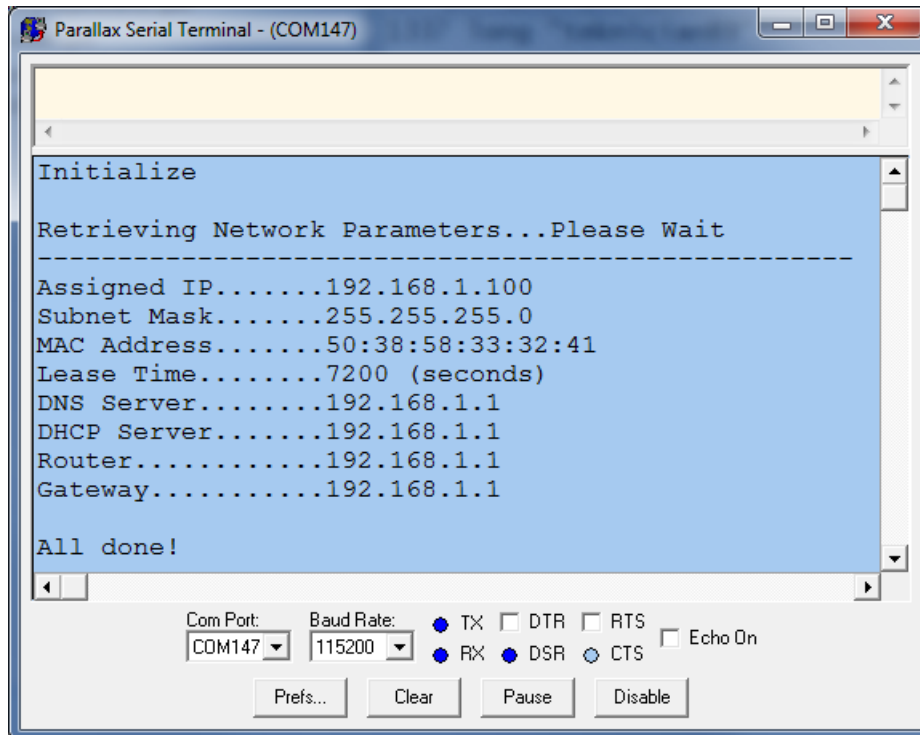
Parallax cannot assist in home router configuration due to the wide variety of routers, configuration options, and network topologies. Many of the downloadable demonstration programs, including the base web server software for the W5200, assume the most common network configuration and configures the W5200 to work with most home networks, as shown on page 4. The W5200 can be configured manually, but additional knowledge of the Propeller, networking protocols, and your network's configuration is required.

Network Configuration Settings

To get your QuickStart + W5200 board talking on the network, you need to tell the W5200 some things about the network it is to talk to. There are two ways you can go about setting up these network settings: manually by statically assigning the settings, or dynamically by using a helper object to make a request to the router for these settings. Both of these methods may require some modification to the source code, depending on your network configuration.

Requesting a Dynamically Assigned IP Address for the W5200

Most home networks use a router that acts as a DHCP server, among other things. This server leases an IP address to a network device that requests one, such as your computer or the W5200 board. A helper object has been written to perform this operation – Dhcp.spin. You can run the DhcpObjectDemo.spin to see an example of this helper object in action, and to print network address information assigned to your QuickStart + W5200 board. These are the settings that my router assigned to my QuickStart + W5200 board:



```
Parallax Serial Terminal - (COM147)

Initialize
Retrieving Network Parameters...Please Wait
-----
Assigned IP.....192.168.1.100
Subnet Mask.....255.255.255.0
MAC Address.....50:38:58:33:32:41
Lease Time.....7200 (seconds)
DNS Server.....192.168.1.1
DHCP Server.....192.168.1.1
Router.....192.168.1.1
Gateway.....192.168.1.1

All done!
```

Com Port: COM147 Baud Rate: 115200 TX DTR RTS RX DSR CTS Echo On
Prefs... Clear Pause Disable

Your router will dynamically assign an available IP address to your QuickStart + W5200 board when a request is made based on the MAC (Media Access Control) address entered into your program's source code. If a request by a device with the same MAC address is received within the router's lease time window, the device that made the request will receive the IP address previously allocated to it. In other words, your W5200 will receive the same IP address as long as the MAC address stays the same between requests and if the lease on that particular IP address has not expired.

It is important to note that **each device on your network must have a unique MAC address**, as the MAC address is the determining factor in what IP address is assigned to the device requesting it. You may experience network problems if more than one device attached to the network has the same MAC address!

Setting Static Network Address Settings.

Sometimes it is useful to be able to set the W5200's network address settings manually. You may want to do this if you want to assign your QuickStart + W5200 board an IP address that doesn't change, or you want to force it to communicate with non-default address settings. These are some of the common settings you can change – the methods are located in the W5200.spin driver object file:

```
PUB SetGateway(octet3, octet2, octet1, octet0)
PUB SetSubnetMask(octet3, octet2, octet1, octet0)
PUB SetMac(octet5, octet4, octet3, octet2, octet1, octet0)
PUB SetIp(octet3, octet2, octet1, octet0)
```

And an example of these methods in use:

```
OBJ
wiz : "W5200"

PUB YourProgram

wiz.SetGateway(192, 168, 1, 1)           'Tell the W5200 the router's address
wiz.SetSubnetMask(255, 255, 255, 0)     'Statically set the subnet to communicate on
wiz.SetMac($50, $38, $58, $33, $32, $41) 'Statically set the W5200's hardware ID
                                         ' (should be unique on the network)
wiz.SetIp(192, 168, 1, 130)            'Statically set the W5200's IP address
```

Quick Start Web Server Application

This example web server program for the QuickStart + W5200 board can serve files requested by a web browser or other application that follows the HTTP protocol. This particular web server implementation automatically searches for a specific string and will replace it with a value stored in memory as the page is being sent to the requester. To see this demonstration web server in action, follow these steps:

1. Using a file browser (Windows Explorer), navigate to your unzipped demonstration program directory.
2. Enter the "Simple_server" sub-directory.
3. With your MicroSD card reader, copy the file index.htm to the SD card. Make sure you put index.htm in the SD card's root directory (do not put it in a folder).
4. Safely remove the MicroSD card from your computer.
5. Insert the MicroSD card into the W5200 board's MicroSD card slot. Do this with your QuickStart + W5200 board unpowered.
6. Attach your QuickStart + W5200 board to your computer via the QuickStart board's USB connector.
7. Open the simple_server.spin file with the Propeller Tool.
8. Compile and download the simple_server.spin program to the Propeller by pressing the F11 key on your keyboard.

Once simple_server.spin has been downloaded to your QuickStart + W5200 board, the web server will start. In order to view the web page served by your QuickStart + W5200 board, you need to know the IP address that your router assigned to your QuickStart + W5200 board. If you do not already know what this IP address is, refer to the "Requesting a Dynamically Assigned IP Address for the W5200" section on page 7.

9. Open your favorite web browser and enter the IP address of your QuickStart + W5200 into the browser's address bar.
10. Your browser should display the webpage dynamically rendered from the QuickStart + W5200 board.

11. Refresh the page in the browser. Notice how the number after “This is a test” is counting up? Take a look at how the simple_server.spin program relates to the number displayed in the browser.



HTML Code for file “index.htm”, loaded onto the Micro SD card

```
<html>
<head>
<title>Parse Test Page</title>
</head>
<body>
<p>Testing simple_server.spin</p>
<h1>This is test: <!--PROPVAR00--></h1>
</body>
</html>
```

Spin Code for “simple_server.spin”, loaded onto the QuickStart + W5200 Board

```
CON
_xinfreq = 5_000_000
_clkmode = xtall1 + pll116x

OBJ

webservice : "W5200 Parse and Replace Webservice" 'requires 3 cogs

PUB Go | counter

'Start the web server
webservice.Start

'Your custom web server code goes below!

'Reset the counter
counter := 0

repeat
'update the counters
counter++

'save the uptime counters to the user variable space
webservice.SetUserVariable(0, counter)

'wait for 100 milliseconds
webservice.Pause(100)
```

About the simple_server.spin Program

The IP address of the WIZnet W5200 board is automatically obtained by your network's DHCP server. In most cases, the DHCP server will be your network's router. Since a DHCP server dynamically assigns IP addresses by usage and the number of clients currently connected to the network, your WIZnet W5200 board's IP address will almost certainly be different than the one in the screenshot above. To determine your WIZnet W5200 board's IP address, refer to the "Requesting a Dynamically Assigned IP Address for the W5200" section on page 7.

Note that the SD card driver used to allow the Propeller to interface with the SD card cannot descend into sub-directories. Thus, to serve files from the SD card, the files need to be located in the SD card's root directory. In other words, keep all files you expect to serve with the W5200 board out of folders. Additionally, the SD card driver does not support long file names, so make sure that all of your file names are 8 characters or less with a 3-character or less file extension.

Within the index.htm HTML web page file, there is a special HTML tag that simple_server.spin looks for when the page is rendered to the browser. This specific string should have the form:

```
<!--PROPVARxx-->
```

...where the "xx" is replaced by numeric values between 00 and 99. This gives you the ability to place 100 numbers into the web server's memory. When a request for a web page is made, the web server begins to serve the page, while searching for the specific string. When it finds the specific string, the web server replaces the specific string with the numeric value of the user variable referenced by the specific string.

You can update the value held in a user variable slot with your program by calling:

```
PUB SetUserVariable(varNumber, val)
```

...which is located in the W5200 Parse and Replace Webserver.spin object file. The first parameter, `varNumber`, is the user variable slot to update. This value can range from 0 to 99. The second parameter, `val`, is the value you want to store in that user variable slot.

Resources and Downloads

Check for the latest version of this document, free software, and example programs on the product page. Go to www.parallax.com and search "40002".

Revision History

Version 1.0: Original release