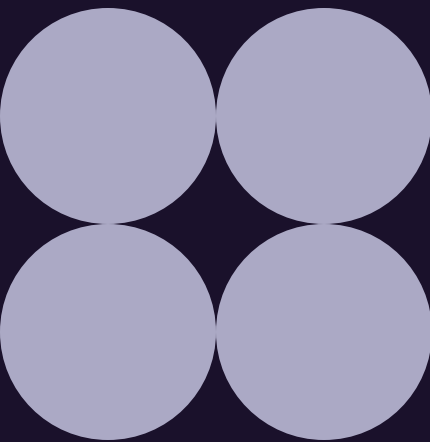
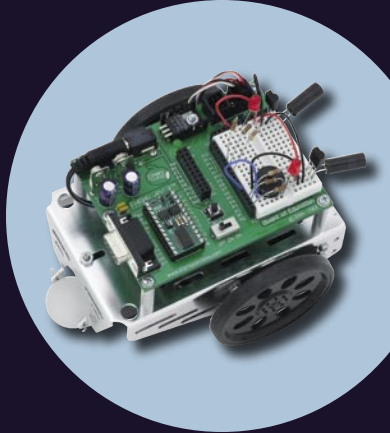


# Stamps In Class: The Ultimate Guide

Electronics education for ages 14+ by:

# PARALLAX



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4



Electronics education  
is fun and engaging  
with the original  
**BASIC Stamp®**  
microcontroller!





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Toll-Free Technical Support: 888-99-STAMP (8267)

[ *International customers use (916) 624-8333* ]

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[www.stampsinclass.com](http://www.stampsinclass.com)

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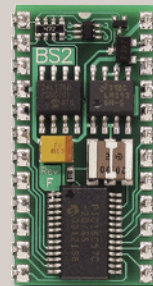
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**If you're an administrator or curriculum developer, you know that technology education is a major priority in your school. Our Stamps in Class curriculum will propel your district to the top of the charts in terms of providing your students with high tech learning.**

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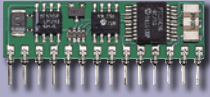
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*The BASIC Stamp module was envisioned by Parallax founders to bring the power of microcontrollers to ordinary people. Parallax knew the BASIC Stamp module would be special - it was the tool we wanted for our own hobby projects. When hobby transformed into business we developed a manufacturing facility, distribution network, off-shore relationships and of course a high-quality office team.*



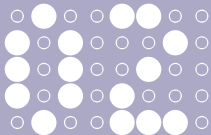
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888-512-1024



**BASIC Stamp 1;**  
#BS1-IC; \$29.00

**BASIC Stamp 2;**  
BS2-IC; \$49.00;  
EDU-BS2-IC; \$41.65

**Board of Education;**  
#28150; \$65.00;  
#EDU-28150; \$55.25



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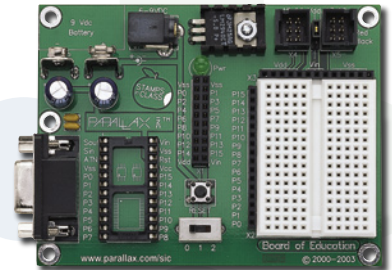
## Brief History of the BASIC Stamp



The release of the BASIC Stamp microcontroller in 1992 was a revolutionary invention at the time yet this was unknown to Parallax founders. For the first time, "ordinary" people were able to program a microcontroller which gave them powerful I/O commands that made it easy to connect to other electronic components. Many advancements have been made to the BASIC Stamp module line-up since the BS1, but the multiplicity of the customer base remains the same. And now the BASIC Stamp module is at the forefront in education.

### Stamps in Class

The Stamps in Class program was created in 1998 to support education. The primary goal was to provide educators with support materials to teach students a range of microcontroller-related skills. This included everything from programming, robotics, analog and digital, electronics, and even process control. The key to jump-starting Stamps in Class was the release of the Board of Education (BOE), the availability of free educational texts via downloads, and the launching of our popular BASIC Stamp Educator's Courses. The BS2 and Board of Education platform has been used in courses all around the world and has inspired students to embark on engineering career paths. Today, courses are held across the United States and in such places as Canada, New Zealand, The Netherlands, and Hong Kong. The combination of industry-quality hardware/electronics with hands-on training and free curriculum provides educators with the opportunity to teach on the cutting edge.



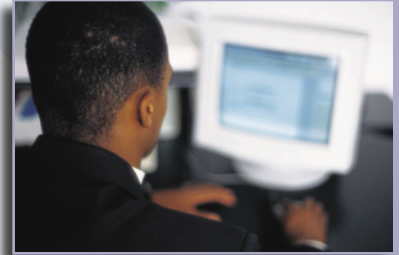
### BASIC Stamp Software

Its ease of use and vast support resources enable the BASIC Stamp microcontroller to reach persons of all backgrounds. The PBASIC language is very concise, hardware driven, and upgrades are always free. No firmware needs to be changed on your BASIC Stamp module, just download it to your PC and you're ready to go. In 2003, PBASIC 2.5 was released to customers and was met with strong enthusiasm due to the enhancements which made it more structured. Also, for the first time, it enabled customers to program the BS1 in Windows instead of DOS! Parallax continually strives to make advancements to the language itself and the editor, making the interface increasingly powerful for you.



# Parallax Support for Windows and Mac OS

Parallax provides customers with the proper editing tools for your BASIC Stamp microcontroller in three platforms: Linux, Mac, and Windows. The Windows environment is typically the initial focus for editor upgrades and then the Mac and Linux tools are updated accordingly via the BASIC Stamp Tokenizer. Major software updates are posted on our web site and are announced to the BASIC Stamps Yahoo! Discussion Group. The latest software is accessible through the Downloads section on the web site under BASIC Stamp Software.



## PBASIC 2.5 Overview

The PBASIC 2.5 language is included in all versions of the BASIC Stamp Windows Editor v2.0 and higher. PBASIC 2.5 includes desirable features such as syntax highlighting, IF...THEN...ELSE, and improved editing features. The new PBASIC 2.5 is designed to make structured programming much easier and more enjoyable with the BASIC Stamp 2 series of modules. What you previously found difficult, if not impossible, is now possible with several new compiler enhancements. It's important to note that your old code will compile in the new editor as it is, but the new editor provides additional support for the great features of PBASIC 2.5 with the addition of a simple directive at the top of the program.

Module Type	Editor Version	PBASIC Lang. Version
BASIC Stamp 1	v2.1 Only	1.0 only
BASIC Stamp 2 Series	v2.0 and v2.1	2.0 and 2.5

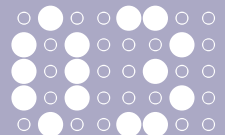
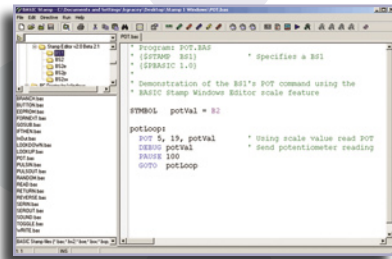
## PBASIC Tokenizer

The PBASIC Tokenizer is available in a pre-compiled shared library for various platforms, such as:

- **Windows** (95 and above)
- **Linux**
- **Macintosh** (OS 9 and OS X)

The tokenizer supports the BASIC Stamp 2, 2e, 2sx, 2p and 2pe modules. Any skilled developer can create a BASIC Stamp module development environment by linking the tokenizer to their software (to compile) and implementing the

BASIC Stamp Programming Protocol (to download). Specific downloads are available for developers of Mac and Linux platforms as well as end users. Please visit the Downloads section and select the BASIC Stamp Tokenizer link for the file downloads and more information.



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# Learn from Parallax BASIC Stamp Educator's Courses



Visit us online for a complete course listing!

An important part of the Parallax Stamps in Class program is to train educators on the use of the BASIC Stamp microcontroller. To date, Parallax has instructed over 1,800 educators around the world. The Educator's Courses are suitable for high school, community college, university, and vocational-technical school instructors. Each course is a non-commercial partnership between a sponsoring educational institution and Parallax. During a typical 2 day course, our instructors will teach participants how to build and program circuits with the BASIC Stamp module. Day 1 focuses on projects related to WAM, and Day 2 centers around the Boe-Bot.



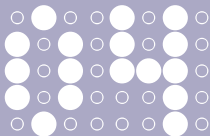
## Parallax BASIC Stamp Educator's Course Topics

- Introduction to the BASIC Stamp module and PBASIC programming
- Digital input and output control with an LED and pushbutton
- Analog Input - use the RCTIME command to read a potentiometer
- Parallel digital Output using I/O control and a 7-segment LED
- Build the Boe-Bot and take it home after the course
- Servo theory of operation
- Implement infrared sensors to detect and avoid objects
- Use dead reckoning to navigate your autonomous robot from Point A to Point B
- Build subroutines, reading directions stored in the EEPROM

## Choose Your project

- Synchronous Serial Communication using a Dallas Semiconductor 1620 circuit from the previous project. Display the temperature on a 2x16 serial LCD
- Wireless control of Boe-Bot
- Build a project with the Memsic Accelerometer
- Take humidity and temperature readings with sensor
- Experiment with Stepper Motor

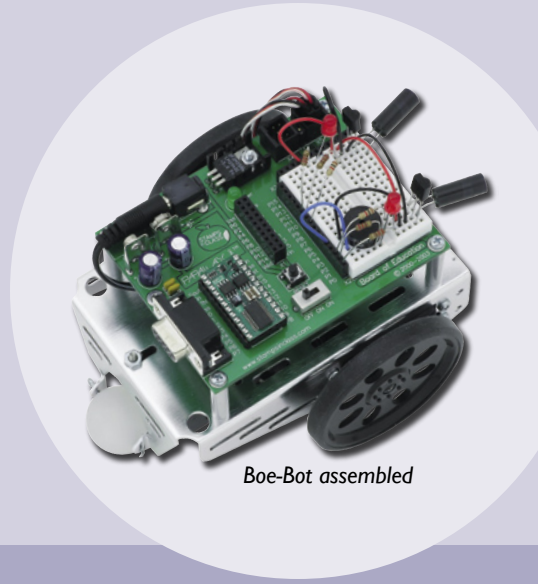
**Note:** Activities and projects are subject to change and may vary based on individual course progress.



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# How to Host a BASIC Stamp Educator's Course

It's very easy to host your own BASIC Stamp Educator's Course. By planning in advance and contacting Erik Wood at Parallax ([stampsinclass@parallax.com](mailto:stampsinclass@parallax.com)) with your ideas, we are bound to have a successful course. The host is an integral part of the promotional efforts since it is the host that knows of local educational connections and groups. Parallax promotes the course via our web site and the various Yahoo! Discussion Groups. The web site contains valuable downloads including set up arrangements and a sample syllabus to supplement the information below.



Boe-Bot assembled

*From the host and sponsoring educational institution we require the following to ensure a successful course:*



## Step 1

A minimum enrollment of 10 participants 4 weeks prior to the course date.



## Step 2

A computer laboratory with a minimum of 15 PC's that have serial port connections. Ideally, our BASIC Stamp Editor software would be installed before the course. LCD Projector Screen is also a requirement.



## Step 3

Notification to your local and state technology groups that the course will occur. Hosts should be willing to actively market the course at the local level. Parallax provides each host with .pdf course flyers which are ideal for displaying in local libraries, community centers, teacher lounges, etc. In addition to the flyer, we advertise the courses online and contact our educational discussion groups (Stamps in Class, Parallax Educators).



## Step 4

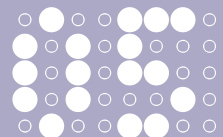
Course Registration. We process registration received by online orders or school purchase orders. If you have the ability to organize registration of a minimum educational group of 15 or more persons, then we can revisit the registration process. We can be flexible to meet your course needs and hold a course sponsored by the school district, university, or educational consortium without open enrollment.



## Step 5

The hosting school should provide a facility or the means to organize lunch. Parallax assess each course on a case by case basis. Lunch is not included in the standard registration fees. We prefer to keep the meals simple and well-planned in order to get back to having fun in the lab.

*If you have any questions, please e-mail Erik Wood at [stampsinclass@parallax.com](mailto:stampsinclass@parallax.com) or call our toll free number requesting ext. 106.*

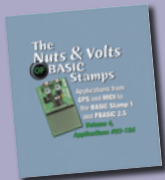


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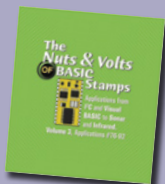
# Classroom Support: Parallax Publications



#70013; \$19.95



#70010; \$14.95



#28168; \$9.95



#70002; \$29.95



## Stamps in Class Tutorials

The Parallax Stamps in Class team consists of six authors, some within Parallax and others in universities. In 2003 we added a full-time professional editor to ensure that our texts were meeting professional editing standards. In 2004 the editor and authors began to explore the applicability of different curriculum standards so Parallax can provide more direction to our educators using microcontrollers. Each book requires approximately one to three years to develop, test and distribute the first copies. The Stamps in Class books are all available for free download and duplication by educators.

## Parallax, Inc. Press

Parallax, Inc. Press publishes several titles for the BASIC Stamp module each year. These books are ideal supplements to our Stamps in Class Student Guides because they present a unique variety of sensors, industrial applications and hobby projects. All Parallax books are registered copyrights with ISBN numbers.

### Al's "World Famous Stamp Project of the Month" Anthology

A 67-project collection from Al Williams is now available in this book. Applications include PC / BASIC Stamp PID controller software, connecting the BASIC Stamp modules to the internet, communication with LCDs, Morse code, keypads, interfaces to PDAs and PCs. 420 pages (ISBN 1-928982-25-5).

### Nuts & Volts of BASIC Stamps Volume 4

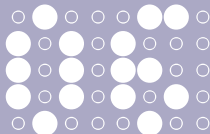
Includes 12 columns from Nuts & Volts Magazine with the subtitle "Applications from GPS and MIDI to the BASIC Stamp 1 module and PBASIC 2.5". This entire book is also available for free download in PDF. 234 pages (ISBN 1-928982-24-7)

### Nuts & Volts of BASIC Stamps Volume 3

Highlights of Volume 3 include infrared decoding, expanding I/O with I<sup>2</sup>C, 1-Wire weather station, environmental sensing, ultrasonic object detection and use of inclinometers. This entire book is available for free download in Adobe PDF. 268 pages. (ISBN 1-928982-17-4)

### Programming the SX Microcontroller

Want to understand how a microcontroller is programmed in the lowest level? This tutorial-based set of projects and explanations from Guenther Daubach uses the Parallax SX-Key to program SX chips in assembly language. The step by step approach ensures an understanding of the bit-level operations necessary to program the SX. 455 pages. (ISBN 1-928982-16-6)



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# Online support: Parallax Discussion Groups

Teachers may join our Parallax Educators Group online and get the answers you need in a hurry. You'll have access to other BASIC Stamp educators and Parallax pros. Get your problems solved, your questions answered, and learn tips and tricks from teachers who have already "been there."



**ParallaxEducators Group** is strictly for educators who use the Parallax BASIC Stamps in Class program. The primary purpose of this list is to provide a collaboration between Parallax and the educators who use our products.

The list is also a place where educators can share ideas about using the BASIC Stamp microcontroller in their classes for robotics, programming, sensor interfacing, process control, etc. This group has an open download area for members. In this area you can download Teacher's Guides and related resources for you to use in your classes. Parallax will be actively seeking your input for our educational program on this list. Parallax may provide free hardware reimbursements or discounts on orders to educators and educational institutions who make significant contributions to our Stamps in Class program. The list is moderated and we verify that each subscriber to the newsgroup is involved in education.



**StampsInClass** is a discussion group for educators and students who use Parallax BASIC Stamp microcontrollers in their class. The list serves as a discussion hub for educational ideas and projects. Common topics include the Parallax Stamps in Class curricula (*What's a Microcontroller?*, *Robotics with the Boe-Bot*, *Industrial Control*, *Applied Sensors*, etc.), students seeking help from teachers on their projects, and the occasional new product announcement focused on education.



**BASICStamps Group** is our most popular and widely utilized discussion forum with over 4,000 subscribers. This is a place where BASIC Stamp enthusiasts can discuss current projects and ideas and share knowledge between beginners and experts. Chances are high that others have faced similar hurdles and have had difficulties on a range of levels. Get help quickly from this group.



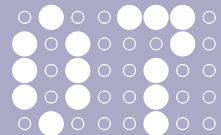
The **ParallaxTranslators Group** is a forum of people who contribute to the translation of Parallax literature that can be downloaded for free from the Parallax website ([parallax.com](http://parallax.com)). Some of our Stamps in Class documentation has already been published in French, German, Chinese, Turkish, Swedish, Spanish and Italian.

“

*I would like to thank your company for your energetic and unfailing dedication to education. I have been on the Yahoo Parallax Educators group for a short while, and am impressed with the new curriculum you folks are generating. I continue to be amazed at the new experiments, and improvements to the old ones, that is ongoing. I wish kids in schools could spend more time working hands-on with the BASIC Stamp, rather than unending hours listening to factual litanies. If we could teach our kids to think, and enjoy doing so, our country would be much better served!*

”

*Charlie Knox  
Math/Science Instructor  
Southwest Wisconsin  
Technical College*



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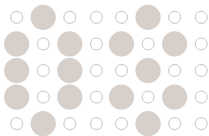
# Ready to get started with Stamps in Class?

Use this handy flowchart to plot your path through the Stamps in Class tutorials. Once you have chosen texts that interest you, see how our different hardware kits work together on the hardware relationships overview (pages 24 and 25).

To get started with your class, choose an introductory tutorial and follow the path along whichever subject track will be most applicable for your students.


**Please note:** while you can start with the *Robotics with the Boe-Bot* text, it is recommended that you have your class complete the *What's a Microcontroller?* text first. *What's a Microcontroller?* is our most complete introductory text that will explain all aspects of PBASIC programming to your students.


Those students/classes who are already skilled in programming need not go through the introductory texts to use to our higher level tutorials. Parallax's educational paths do not necessarily require a completion of the entire progression.




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LEGEND:

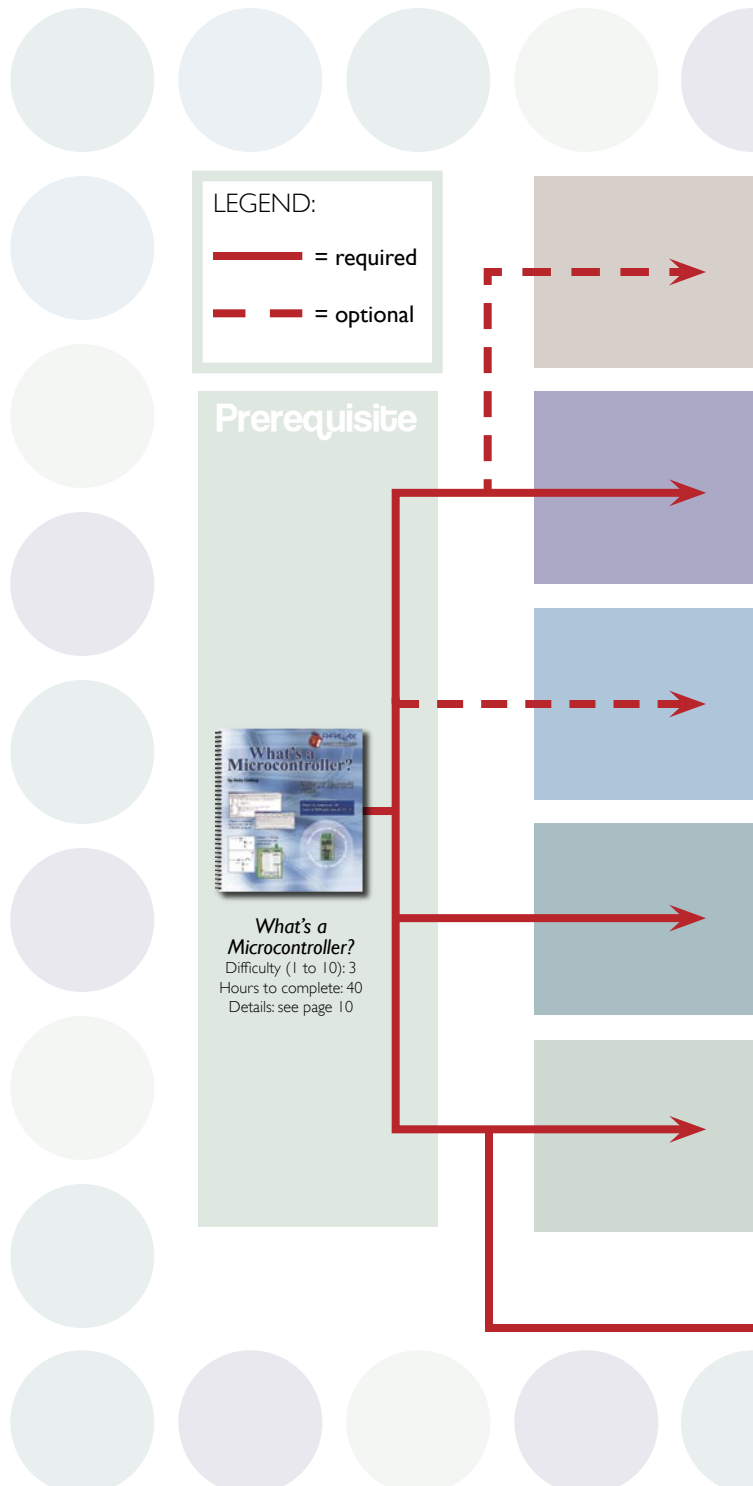
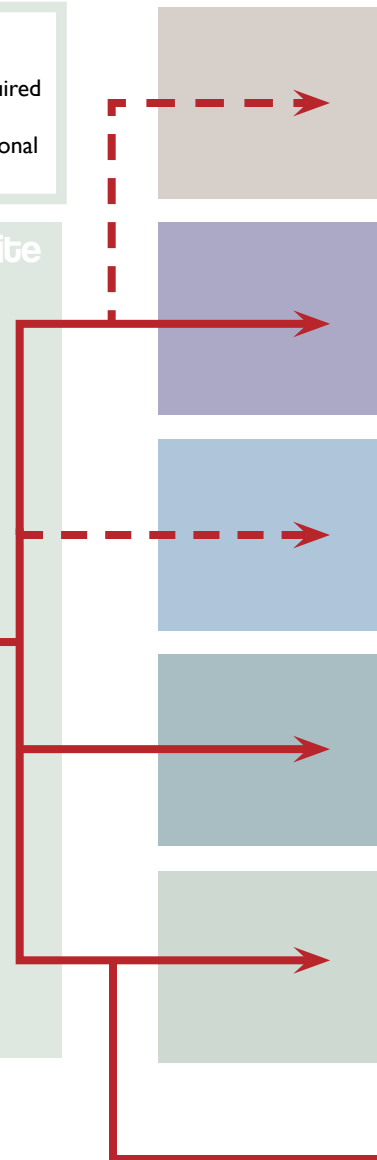
 = required

 = optional

Prerequisite



*What's a Microcontroller?*  
Difficulty (1 to 10): 3  
Hours to complete: 40  
Details: see page 10



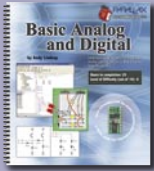


### Elements of Digital Logic

Difficulty (1 to 10): 4  
Hours to complete: 60  
Details: see page 19

Note: EODL is independent of the BASIC Stamp through 8 of its 9 chapters.

Logic



### Basic Analog and Digital

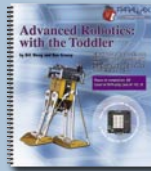
Difficulty (1 to 10): 4  
Hours to complete: 60  
Details: see page 14

Analog/  
Digital



### Robotics with the Boe-Bot

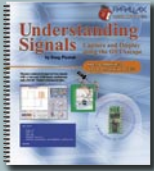
Difficulty (1 to 10): 4  
Hours to complete: 60  
Details: see page 12



### Advanced Robotics with the Toddler

Difficulty (1 to 10): 9  
Hours to complete: 50  
Details: see page 20

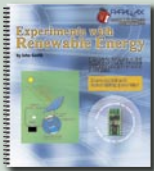
Robotics



### Understanding Signals

Difficulty (1 to 10): 4  
Hours to complete: 35  
Details: see page 15

Measuring  
Signals



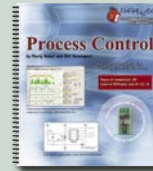
### (Coming Q3 2004) Experiments with Renewable Energy

Difficulty (1 to 10): 7  
Hours to complete: 50  
Details: see page 22



### Applied Sensors

Difficulty (1 to 10): 8  
Hours to complete: 60  
Details: see page 18



### Process Control

Difficulty (1 to 10): 8  
Hours to complete: 60  
Details: see page 16

Sensors &  
Industrial

# What's a Microcontroller?

**What's a Microcontroller? Parts and Text;**  
#28152; \$65.00

**WAM Parts only;**  
#28122; \$39.00

**WAM Class Packs (qty. 20)** available at savings of over \$25 per kit! See [parallax.com/sic](http://parallax.com/sic) for details.

Option: **BASIC Stamp Discovery Kit;** #27207; \$169.00; Includes WAM Parts and Text, Board of Education, BASIC Stamp 2 module, programming cable, CD-ROM, and BASIC Stamp Manual.

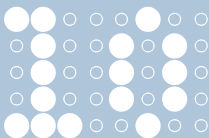
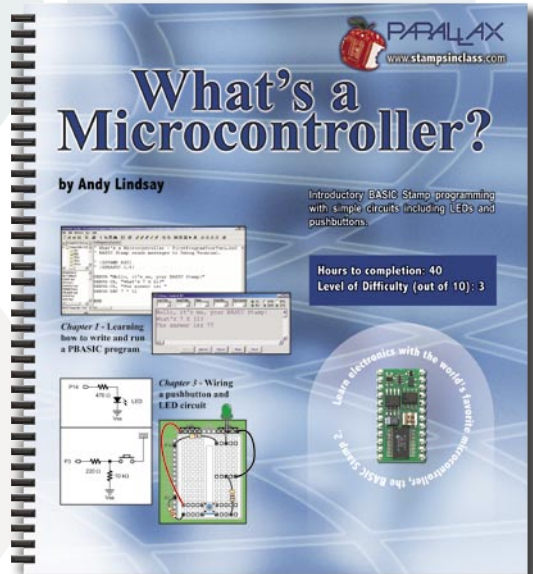
**AT A GLANCE...** Our most popular introductory tutorial, *What's a Microcontroller?* is the best place to begin learning BASIC Stamp programming. The text is highly developed with over 40 hands-on activities and complete PBASIC 2.5 support. This tutorial is perfect for aspiring engineers; embedded control engineers will continue to be in high demand.

As titled, *What's a Microcontroller?* (WAM) answers the question of how to design customized, intelligent inventions using the BASIC Stamp 2 module. The activities incorporate a variety of fun and engaging experiments that appeal to one's imagination using motion, light, sound, and tactile feedback to introduce new concepts. These activities are designed to introduce the user to many basic principles in the fields of computer programming, electricity and electronics, mathematics and physics. Many of the activities facilitate a hands-on presentation of design practices used by engineers and technicians in the creation of modern machines and appliances, using inexpensive and easy to obtain parts. This text is designed to accommodate a wide range of ages and skill levels.

The *What's a Microcontroller?* (v2.0+) activity highlights include the following which are all intended to enhance multisensory involvement:

- Reaction timer game
- Potentiometer-controlled servo
- 7-segment LED light meter
- Nokia Cell Phone ringtone player

The last activity in each chapter typically involves an example project that makes



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the concepts that were introduced up to that point more tangible. The first activity in a given chapter is hands-on so that students can discover how the electrical/electronic component works before controlling/sensing it with the BASIC Stamp microcontroller and a program. The intermediary activities introduce techniques that either support the project in the previous activity or one of the projects from the aptly titled “Projects” section at the end of the chapter.

Throughout the text, you are writing and downloading PBASIC code to a BASIC Stamp module, building circuits on a breadboard, and implementing them with components which include: LEDs (light emitting diodes), a 7-segment display, resistors, capacitors, a piezospeaker, pushbuttons, and a servo. Upon completion of WAM, you will have a solid understanding of writing your own PBASIC programs and building custom circuits to get the results you want.

**Hours needed to complete: 40**  
**Level of Difficulty (1-10): 3**

Note: the Board of Education Full Kit (#28102) or the HomeWork Board is required to use this product.

## Interview with the Author: Andy Lindsay

*Andy Lindsay has re-written the “What’s a Microcontroller?” text after collecting observations and educator feedback while traveling the nation teaching Parallax Educators Courses. Andy received his Bachelor of Science degree in Electrical and Electronic Engineering at CSU, Sacramento. When he’s not busy writing educational curriculum, Andy is a Product Engineer at Parallax. In addition to authoring WAM, Andy has also written “Basic Analog and Digital” and “Robotics with the Boe-Bot.”*

**Q. Wow! What’s a Microcontroller? Version 2.0 has some major improvements. How long did this take you to write?**

A. The book has been in the making for about three years. Each Educator’s Course helped develop it. The actual writing and editing process took about four months.

**Q. What is your favorite thing about the new revision of WAM?**

A. It shows people how to make their own inventions. A programmable brain and circuits used to be for engineers only. Now, any WAM graduate can do it.

**Q. What do you hope those who read the book get out of it?**

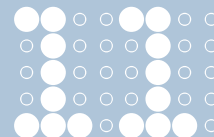
A. Some fun and excitement while doing the activities, the confidence to learn more about programming and electronics, and the skills to start inventing.

**Q. You’re pretty good at this. What are you working on next?**

A. Thanks, WAM is like a collection of building blocks that can be used in machines, appliances, and robots. Next, it’s more books with more building blocks...



Andy Lindsay



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# Robotics with the Boe-Bot

## Boe-Bot

### Robot Kit;

#28132; \$229.00;

#EDU-28132;

\$194.65;

*Includes ROBO Parts and Text, Board of Education, BASIC Stamp 2 module, serial cable, and CD-ROM with software and additional documentation.*

### Robotics with the Boe-Bot Parts and Text;

#28154;

\$129.00

### ROBO Parts only;

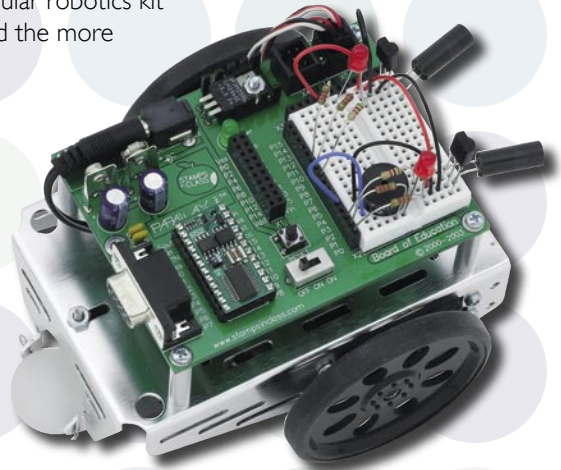
#28124; \$119.00

### ROBO Class Packs (qty. 20)

available at savings of over \$40 per kit! See [parallax.com/sic](http://parallax.com/sic) for details.

The Boe-Bot is Parallax's most popular robotics kit because it appeals to beginners and the more experienced roboticist.

**AT A GLANCE...** This tutorial allows you to use a robust, industry-proven microcontroller to teach robotics. Multiple sensors allow you to detect objects with infrared, follow or avoid light and navigate with bumper wires. Robotics is a sure hit with all ages and incorporates knowledge from such fields as mathematics, physics, programming and electronics.



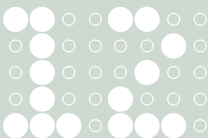
The multifaceted Board of Education™ (BOE) programming board with the BS2 module (both sold separately) is mounted on top of a sturdy chassis, providing you with an excellent base for wiring circuits. The breadboard mounted on the BOE makes it easy for you to experiment with different wiring configurations, allowing you to switch your Boe-Bot very easily from a light follower to an object avoider. Should you happen to make a mistake, there's no soldering involved which saves you valuable time.

The programming of the Boe-Bot is covered in complete detail, beginning with the explanation of servo motors. You'll learn how to use PBASIC commands that will give you complete control of this robot. The first activities start with controlling the robot by sending commands to the servos for traveling predetermined distances and making turns with no concern for the robot's environment. As you proceed through the *Robotics* text, you'll become familiar with advanced programming techniques to use with sensors for ultimate control, feedback, and autonomous navigation. Frequency sweep programming will allow you to even make one Boe-Bot follow another, or as a solo activity you can make the robot follow the edge of a table without falling off!

**Hours needed to complete: 40**

**Level of Difficulty (1-10): 5**

Throughout your Boe-Bot explorations with the *Robotics* text, you'll discover an abundance of helpful information, terminology, and pointers from the pros at

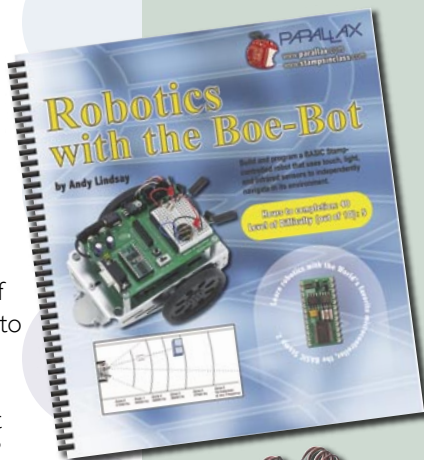


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[www.parallax.com/sic](http://www.parallax.com/sic)

Parallax. Each of the chapters includes an introduction discussing the forthcoming concepts, multiple activities, applications, chapter summary, questions, exercises, and projects. Once you have completed Robotics: with the Boe-Bot, you will be confident with programming, building circuits, reading schematics, and solving problems with a microcontroller.

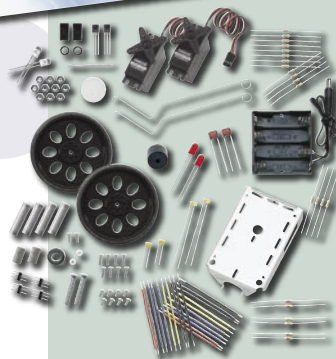
Note: To purchase the Boe-Bot parts along with the BASIC Stamp 2 module and Board of Education order the Boe-Bot Robot Kit (#28132). If you are ordering only the Robotics parts kit (#28124) you will also need to order a Board of Education Full Kit (#28102, page 26).

Educator's Note: The Robotics curriculum is a very popular launching point in the Stamps in Class curriculum, second only to *What's a Microcontroller?* (WAM). Read the flowchart on pages 08 and 09 or contact us via e-mail at stampsinclass@parallax.com if you need guidance with your educational approach.



## Boe-Bot Accessories

The Boe-Bot is infinitely expandable. By simply adding sensors or different wheels you can take on entirely unique challenges and explorations. Below are just a few of our Boe-Bot accessories (robots not included). For the complete selection visit the ROBOTICS section of our website.



**New! Boe-Bot Tank Tread Kit; #28106; \$34.95**

*Turn your Boe-Bot into a tank and roll through rough terrain!*



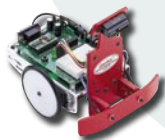
**The Crawler Kit; #30055; \$39.00**

*Enables the Boe-Bot to crawl on 6 legs using simple code.*



**The Gripper Kit; #28200; \$149.00**

*Creative mechanical design allows Boe-Bot to grip and pick up small objects using only one servo.*



**GazBot Infrared Distance Sensor; #28013; \$59.95**

*Solve mazes using infrared and a bumper.*

**Line Follower Application Module; #29115; \$69.00**

*Mounts underneath the Boe-Bot chassis for beginning to advanced line following.*



**Boe-Bot CMUcam; #30051; \$129.00**

*Track images and collect color and variance data.*



**QV356 Boe-Bot Speech Board; #27975; \$119.00; and optional Speech Diphone Chipset; #30050; \$29.00**

*Ships with pre-recorded robotic words that can be arranged and replayed through the on-board amplifier.*



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# Basic Analog and Digital

**Basic Analog and Digital Parts and Text;** #28155; \$45.00

**BAAD Parts only;** #28128; \$29.00

**BAAD Class Packs (qty. 20)** available at savings of over \$16 per kit! See [parallax.com/sic](http://parallax.com/sic) for details.

Basic Analog and Digital is a 162-page student guide with a variety of simple, hands-on BASIC Stamp programming and circuit activities. Common analog to digital (A/D) and digital to analog (D/A) circuits and conversion techniques are introduced. They provide the fundamentals for a host of sensor and control applications as well as a first look inside devices like digital multimeters, function generators, and oscilloscopes.

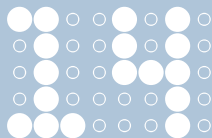
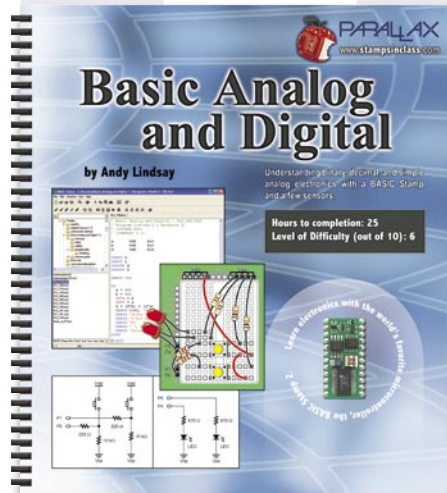
**AT A GLANCE...** Teach your students the difference between analog and digital control with Basic Analog and Digital. Digitally measure voltage, resistance, capacitance, and frequency with simple circuits and the BASIC Stamp 2 microcontroller. After completing the projects presented in this text students will have a greater understanding of electronics that will aid them in the more advanced Stamps in Class tutorials.

Application examples include a comparator, voltmeter, digital oscilloscope, DC supply and function generator, resistance/capacitance meter, and frequency synthesis and measurement. A/D circuits include direct I/O pin connections, ADC0831, and resistor-capacitor (RC). D/A circuits include a resistor ladder, PWM across RC, and an op-amp buffer. Circuits for frequency synthesis and measurement include a 555 multivibrator and piezospeaker.

Revised in 2003 to include PBASIC 2.5 and improved figures and schematics, this text can be studied concurrently with other Stamps in Class texts and it is suitable for any student who has the skills presented in WAM.

The text was written by Andrew Lindsay of Parallax, and is available for purchase or free download. This kit requires a BS2 module and Board of Education (BOE Full Kit #28102), sold separately.

**Hours needed to complete: 25**  
**Level of Difficulty (1-10): 5**



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[www.parallax.com/sic](http://www.parallax.com/sic)

# Understanding Signals with the OPTAScope

**AT A GLANCE...** The *Understanding Signals Student Guide* is an excellent kit to accompany the *Robotics with the Boe-Bot* and *What's a Microcontroller?* texts and may be completed concurrently or alone. A cost effective approach to learn about electrical signals readings with a USB digital oscilloscope. Topics include pulse width modulation, serial communication, RC networks, and operational amplifiers.

The OPTAScope is a USB-based oscilloscope, perfect for education, hobby and for portable applications. The OPTAScope electronics are enclosed in a powder-coated case and require no external power supply. OPTAScope Software for Windows supports common scope features including rising/falling trigger settings, waveform measurements (MIN, MAX, frequency, period). BMP screen captures, and the ability to save setups are all standard in the software.

## OPTAScope Technical Specifications

- 2 channels and an external trigger (auto and normal modes)
- 1 Ms/s max sample rate on one channel; 500 Ks/s sample rate with two channels
- 20 Vpp Maximum Input for Channel 1 and Channel 2
- 200 kHz Bandwidth
- 8-Bit Vertical Resolution
- 1 M ohm Input Impedance
- FFT measurement

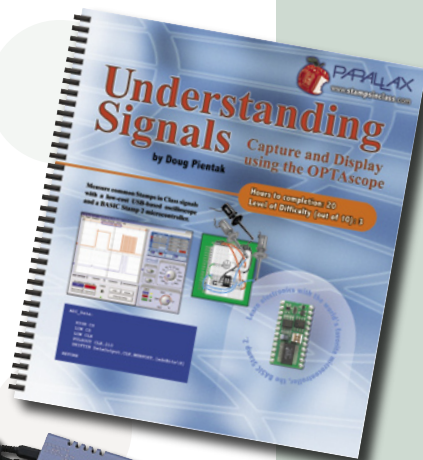
The experiments demonstrate the following signals: analog inputs from photoresistors, synchronous and asynchronous serial communication; single and dual sine waves; servo pulse signals over an entire range of motion; pulse width modulation with infrared; decoding of handheld infrared remote control signals and op-amp signals used in amplifier circuits.

**Hours needed to complete: 20**  
**Level of Difficulty (1-10): 3**

**Understanding Signals Parts and Text; #28119;**  
**\$189.00**

**Note:** The OPTAScope oscilloscope is not available for individual purchase.

**US Class Packs (qty. 20)** are available at savings of over \$19 per kit! See [parallax.com/sic](http://parallax.com/sic) for details.



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# Interview with the Author: Martin Hebel

**Q. *Industrial Control* is undergoing major improvements including a name change. What are the key goals for the new *Process Control* (expected release in Summer 2004)?**

**A.** The revision goals to *Industrial Control* stem from three major sources:

- A desire to better explain fundamentals of input signal conditioning, driving loads, and process control scenarios.
- Focusing on essential theory taught to sophomores in the Electronic Systems Technology program at Southern Illinois University.
- Meeting the standards set forth in *What's a Microcontroller?* for teaching and reinforcing basic principles.

The goals include a deeper discussion on transistor theory and use, common op-amp configurations, and other essential knowledge that was highlighted in *Industrial Control* but not fully explored. Additionally, the use of StampPlot Pro allows customized graphical user interfaces to highlight the fundamentals explored in each activity.

**Q. What is your favorite aspect, concept, or project in the upcoming text?**

**A.** That's a tough question. There are so many areas of the text that excite us. The use of the new opto-reflective switch for the fan tachometer is great as a tool in teaching about proper transistor configurations for response or sensitivity. The use of StampPlot for interactive PID control is great for on-the-fly system adjustments to the control system in StampPlot's use as

a SCADA interface. I could go on, but two is more than you asked for anyway!

**Q. What do you hope those who read the book will gain from it?**

**A.** We hope those who have completed WAM?, or individuals with basic programming and electronics knowledge can really benefit by exploring deeper on these subjects with this text. It is focused on the principles in performing process control, whether it is controlling the film-canister incubator supplied with the parts kit, or a large scale, high-voltage high-current system.

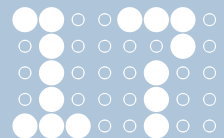
**Q. What are you working on next?**

**A.** For our next trick... As the authors of StampPlot we will be working this summer to make improvements to the software for users wishing to design their own custom interfaces and be able to add new controls to the interface. Thanks to Parallax, the software is free to use with this and other texts, but those wishing to develop interfaces for their own use may do so with a developer's license.

*Note: Will Devenport of SIU is the co-author of *Process Control*. Dr. Barry Shahian of CSULB is a contributing author.*



*Martin Hebel*



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# Applied Sensors

**Applied Sensors  
Parts and Text;**  
#28153; \$79.00

**AS Parts only;**  
#28126; \$59.00

**AS Class Packs  
(qty. 20)** are  
available at savings of  
over \$30 per kit! See  
[parallax.com/sic](http://parallax.com/sic) for  
details.

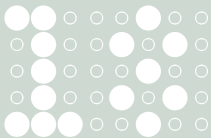
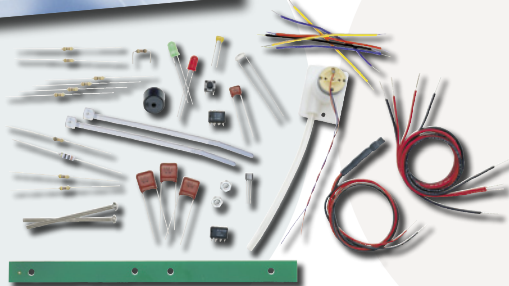
**AT A GLANCE...** Collecting targeted information with a microcontroller is the core of this text. It is appropriate for environmental/science courses that want to incorporate technology into their program. Weather monitoring enthusiasts, and those that want to learn more about serial communication will also find this text to be very valuable and engaging. Authored by Dr. Tracy Allen ([www.emesystems.com](http://www.emesystems.com)), a well renowned scientist in the field of datalogging.

*Applied Sensors* was written by Dr. Tracy Allen of *Electronically Monitored Ecosystems* in Berkeley, California. The 200+ page text is the most complete primer on the structure of programming BASIC Stamp modules, sensor calibration, and serial communication in the Stamps in Class series. Dr. Allen continues to be a valuable contributor to the BASIC Stamps Yahoo! Groups online forum and implements BASIC Stamp modules in his OWL2C data logging product line.

The concepts are taught using an earth science theme with emphasis on resistor/capacitor networks, serial communication, and data logging. The first experiment walks you through the steps of measuring temperature with the DS1620 temperature chip and a handful of parts. The text builds in complexity as you build more challenging circuits, programs, and concepts related to sensors.

The 6 chapters consist of the following topics: Piezo and Temperature Transducer; Data Logging; Temperature Probe for Micro-Environments; Light on Earth and Data Logging; The Liquid Environment; Measurement and Control.

**Hours needed to complete: 50**  
**Level of Difficulty (1-10): 7**



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# Elements of Digital Logic

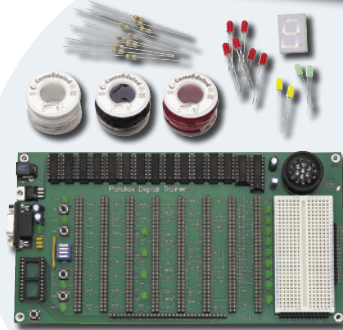
**AT A GLANCE...** *Elements of Digital Logic (EODL)* is a hands-on introductory logic course relevant for today's student. The text has a revolutionary approach to digital logic, combining theory with hands-on experiments. Your students will acquire skills to tackle issues with software, hardware, and hybrid solutions. *EODL* implements a free Logic Simulator software to provide an interactive learning environment.

The course covers: basic, combinational, sequential logic, problem solving methods and solution design. The student is exposed to: simple DC circuit theory, schematic symbols, number systems, and simple BASIC programs.

Chapters 1-4 are based on the Parallax Logic Simulator software. Using this free software, students gain an understanding of logic concepts, gate operation, type of signals, and truth tables. Chapters 5-9 are based upon the Digital Trainer Board and expose the students to more complex logic elements and concepts. The derivations of logic elements and design solutions of simple logical problems are covered using Boolean Algebra as a tool. Chapter 9 utilizes the BASIC Stamp 2 module (not included). Each project is implemented 3 times: in hardware, software, and as a hybrid. After critiquing the hardware and software approaches, the hybrid is designed to exploit the strong points of each previous solution.

**Hours needed to complete: 60**  
**Level of Difficulty (1-10): 5**

Successful completion of this course gives you two possible methods of solving real-world problems. Also, you will possess the skills necessary to derive the most correct solution for the problem. It's absolutely clear that the hands-on approach of *EODL* produces a confident user with practical problem solving skills. This course is designed for a lab-style environment, lending itself well to a class where students work in pairs. Appendices are provided as reference material so that this book may "stand alone" for individual instruction. A teacher's guide is available on the Parallax Educators discussion group.

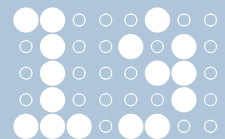


**Elements of Digital Logic Parts and Text;**  
#28201; \$59.00

**EODL Parts only;**  
#28159; \$54.00

**EODL Class Packs (qty. 20)** are available at savings of over \$10 per kit! See [parallax.com/sic](http://parallax.com/sic) for details.

**Note:** In addition to the Elements of Digital Logic parts kit, you will need a power supply and a serial cable (both sold separately). For Chapter 9, you will also need a BASIC Stamp 2 module, sold separately (#BS2-IC).



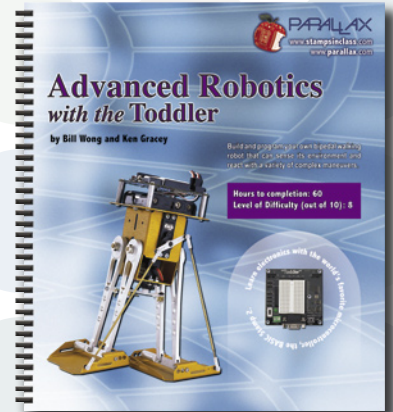
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# Advanced Robotics with the Toddler

**Advanced Robotics with the Toddler; Gold; #27310; Blue; #27311; \$249.00 EDU; \$211.65**

**Toddler Class Packs (qty. 20)** are available at savings of over \$45 per kit! See [parallax.com/sic](http://parallax.com/sic) for details.

**AT A GLANCE...** Build and program your own bipedal walking robot that can sense its environment and react with a variety of complex maneuvers. Have your students completed *Robotics with the Boe-Bot* and all of the included activities and projects? If so, *Advanced Robotics with the Toddler* is the next step. The activities in this text will teach your students to become versed in understanding dependencies between mechanical and electrical systems.

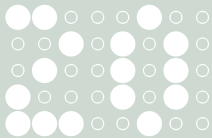


As seen on Fox TV's *John Doe* program reenacting a crime scene with two vagrants running through a neighborhood, our Toddler robot is a true entertainer. The Toddler shifts its center of gravity to walk and turns by sliding its feet in opposite directions. The Toddler is well supported with customer-created discussion groups, video downloads, sensor accessories and our well-written 200+ page *Advanced Robotics with the Toddler* Student Guide.

The Toddler hardware includes CNC-punched and cast/polished aluminum and brass parts. The kit includes all the hardware you need including body parts, legs, ankles, control linkages, screws/nuts/standoffs, BASIC Stamp electronics, etc. The Toddler requires 2-3 hours to assemble and tune. The aluminum parts have holes, slots and configurable mounting angles for your own customization.

The Toddler is controlled by a surface mounted BASIC Stamp 2 module. Four infrared sensors and receivers, LEDs, servos for tilt and stride, resistors/capacitors, speaker, and photoresistors complete the electronics package.

The real experimentation happens when you get into our 200+ page *Advanced Robotics with the Toddler* text, written in Stamps in Class style. Walking robots have mechanical and software interdependencies that require in-depth examples and explanation. The text starts with detailed examples of the Toddler's basic movements but advances to closed-loop control with state-machine programming with infrared and light sensors. Customers using the Toddler will learn advanced embedded programming with PBASIC, efficient code development, sensor feedback, and general control principles.



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Because of the number of possible movements (34) we consider the Toddler to be appropriate for those aged 14 and above. *Advanced Robotics with the Toddler* could be done subsequent to the *Robotics with the Boe-Bot* (page 12) curriculum.



The Toddler Robot Kits (#27310 and #27311) include all the components needed for Chapters 1 through 7. Chapters 8 and 9 require additional parts you may purchase from Parallax. Though we aim to make the kit as complete as possible, including the additional parts would have simply raised the price of the Toddler kits and reduced the number of users who could purchase the robot. The last two chapters demonstrate some of the most interesting Toddler projects, such as state machine programming, subsumption architecture and real-time sensor feedback.

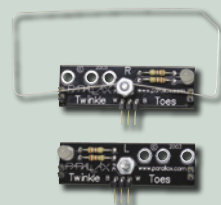
**Hours needed to complete: 80**

**Level of Difficulty (1-10): 9**

*Here is the additional hardware you will need for Chapters 8 and 9, should you decide to do the final experiments:*

**Chapter #8:** Toddler Bumper Sensors "Twinkle Toes"

**Chapter #9:** Memsic 2125 Accelerometer



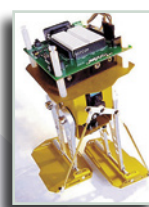
*Toddler Bumper Sensors*  
#27312; \$29.00



*Memsic 2125 Accelerometer*  
#28017; \$29.00

## Toddler Discussion Group

Parallax customer Mike G. Otis started the Toddler Robot discussion group. You can subscribe to this group for free at [http://groups.yahoo.com/group/toddler\\_robot/](http://groups.yahoo.com/group/toddler_robot/). The group has 316 members to date and is still growing.



*Mike Otis*

Discussion includes different bipedal robots and how they operate, customizing to the Toddler with different sensors and hardware, and sharing of new PBASIC code. Many pictures, files and interesting links have been posted on this discussion group.



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# Experiments with Renewable Energy

**Experiments with Renewable Energy Parts and Text;**  
#28145; \$TBD

**EWRE Parts only;**  
#28144; \$TBD

**AT A GLANCE...** Generate 3-phase AC power with this kit, just like real power plants! Expected to be released Fall 2004.

In this text you will learn about the fundamentals of direct current (DC) and alternating current (AC) and how they both apply to our everyday use of electricity. By studying electrical energy as the primary theme, you will also learn simple, yet elegant, programming techniques using the BASIC Stamp microcontroller. For a dramatic visual dimension to your learning activities, we have also integrated StampPlot Pro software which enables students to graph real-time voltage measurements. The experiments use rechargeable batteries, miniature solar cells, and a 3-phase wind-driven AC alternator that, taken together, will help you learn about two forms of renewable energy as well.

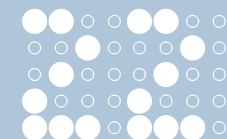
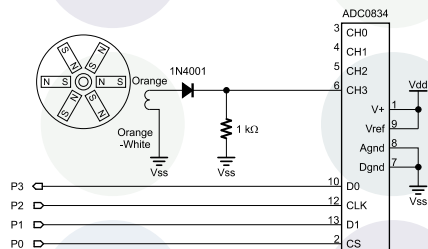
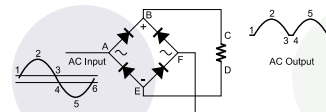
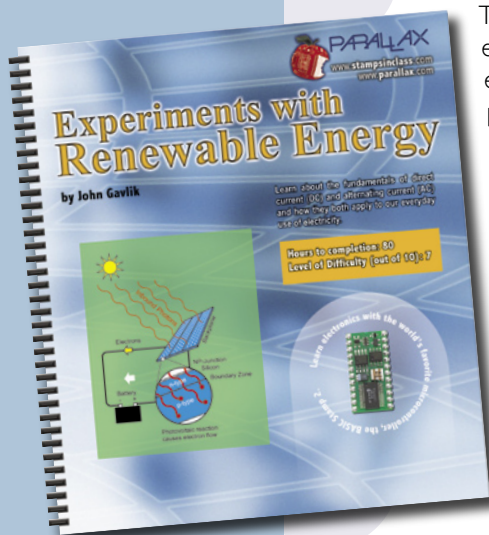
The purpose of EWRE is to introduce students to careers in the energy and power electronics fields. Our country's dependence on electrical power and the electronic components that control and process this power still remains a sleeping giant. Power technologies will dominate at least the first part of the 21st century electronics industry, largely due to our reliance on these computer based technologies. Students should seriously consider careers in the energy and power electronics fields, which will shortly represent the new-growth industries that will cry out for technical talent. This Energy course will inspire students to be involved in the energy and power electronics technology revolution.

The Energy text was created as a subsequent text to the *What's a Microcontroller?* and *Basic Analog and Digital* guides. Therefore, it is assumed that both students and teachers are already familiar with PBASIC commands and reading schematics. This text is authored by *LearnOnLine's* John Gavlik, recipient of the

2002 Power Sources Manufacturers Association (PSMA) Power Electronics Educational Award for his REEL Power Renewable Energy Education Lab project.

Martin Hebel, Co-Author of *Process Control*, contributed to this text as well with the creation of custom macros in StampPlot Pro.

**Hours needed to complete: 80**  
**Level of Difficulty (1-10): 7**



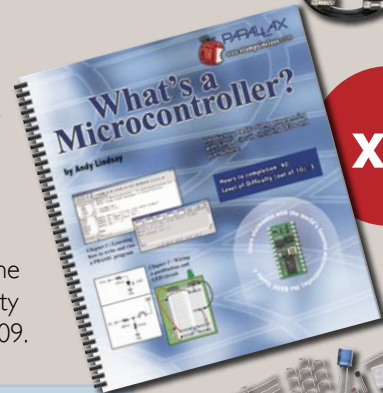
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[www.parallax.com/sic](http://www.parallax.com/sic)

# Stock your entire classroom with Stamps in Class “Class Packs”

Class Packs are core educational kits available in sets of 20 units. Each of the Class Packs contains the Board of Education (BOE) and BASIC Stamp 2 module plus a Stamps in Class tutorial parts kit and text, making it a complete solution for your classroom. *Advanced Robotics with the Toddler* has unique hardware and the Class Pack consists of 20 Toddler Robot Kits.

The pricing of the Class Packs takes educational and quantity levels in to consideration to arrive at the final price, resulting in significant savings for you the educator. If you are placing your Class Pack order with a school purchase order, you may submit the order with this pricing below.

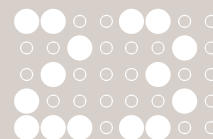
For detailed information on the composition of the Class Packs, visit the individual product pages. For hours to completion and level of difficulty information, see the content relationships flowchart on pages 08 and 09.



*What's a Microcontroller? Class Pack (#28167)*

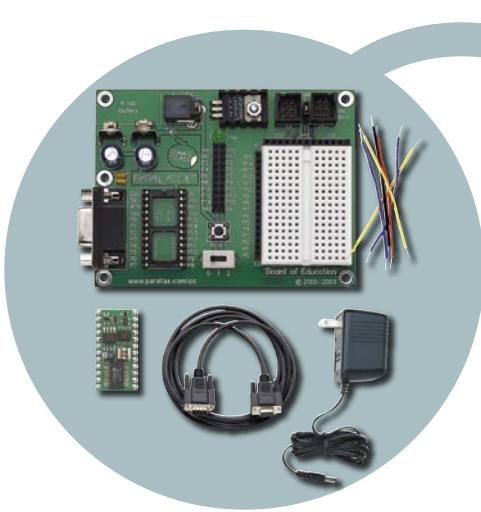
Name of Class Pack and contents	Part Number and Price
<i>What's a Microcontroller?</i> Class Pack: 20 each of the WAM Parts and Text Kit (page 10) and the BOE Full Kit (page 26)	#28167; \$2,800
<i>Robotics with the Boe-Bot</i> Class Pack: 20 each of the ROBO Parts and Text Kit (page 12) and the BOE Full Kit (page 26)	#28132-CP; \$3,700
<i>Basic Analog and Digital</i> Class Pack: 20 each of the BAAD Parts and Text Kit (page 14) and the BOE Full Kit (page 26)	#28172; \$2,595
<i>Understanding Signals</i> Class Pack: 20 each of the US Parts and Text Kit (page 15) and the BOE Full Kit (page 26)	#28174; \$5,395
<i>Applied Sensors</i> Class Pack: 20 each of the AS Parts and Text Kit (page 16) and the BOE Full Kit (page 26)	#28171; \$2,995
<i>Process Control</i> Class Pack: 20 each of the PC Parts and Text Kit (page 18) and the BOE Full Kit (page 26)	#28170; \$2,795
<i>Elements of Digital Logic</i> Class Pack: 20 each of the EODL Parts and Text Kit (page 19) and the BOE Full Kit (page 26)	#28173; \$2,695
<i>Advanced Robotics with the Toddler</i> Class Pack: 20 each of the Toddler Robot Kit (page 20) Note: Toddler Kits are available in blue or gold.	gold #27310-20; blue #27311-20; \$3,995

If you would like to build your own kit, we do offer Custom Kits at quantity 25+. For more information visit the “Custom Kits” page in the EDUCATIONAL section of our website ([www.parallax.com](http://www.parallax.com)).



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## Hardware Relationships among Tutorials

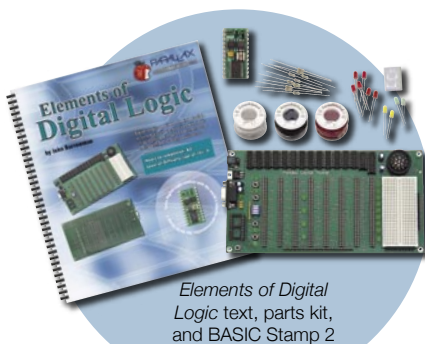


The following tutorials require the **Board of Education Full Kit** (#28102; page 26):

- *What's a Microcontroller?* (page 10)
- *Robotics with the Boe-Bot* (page 12)
- *Basic Analog and Digital* (page 14)
- *Understanding Signals* (page 15)
- *Experiments with Renewable Energy* (page 22)
- *Applied Sensors* (page 18)
- *Process Control* (page 16)

*Some customers prefer using the HomeWork Board instead of the BOE Full Kits. See pages 26 and 27 for details.*

Two of our texts have unique hardware requirements...



*Elements of Digital Logic text, parts kit, and BASIC Stamp 2*



*Toddler Robot Kit*

# \$ Parallax's most Cost-Effective hardware path...

The Board of Education (BOE) and BS2, along with a CD-ROM, power supply, programming cable and pluggable jumer wires are sold together as the BOE Full Kit (#28102; page 26). With this core hardware kit, you simply need to add the parts and text kit from whichever tutorial you choose and begin experimenting.

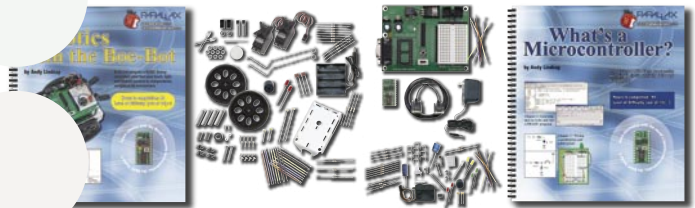
*Elements of Digital Logic* uses the Digital Trainer Board (included in the EODL parts kit) for its experiments. The completion of the Chapter 9 experiment requires a BASIC Stamp 2 module, which plugs directly into the Digital Trainer Board.

*Advanced Robotics with the Toddler* is sold only as a full kit and is offered in the colors gold or blue. The Toddler robot is programmed using a special Toddler board that has a BASIC Stamp 2 microcontroller built right onto it!

**Feel free to contact the Parallax customer service department if you have any questions about hardware.**

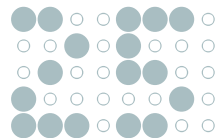
If you plan on taking your class through BASIC Stamp programming via our most popular route, first the introductory *What's a Microcontroller?* followed by *Robotics with the Boe-Bot*, consider the following hardware purchasing strategy:

**Order the Boe-Bot Robot Kit (#28132; page 12) and the *What's a Microcontroller?* Parts and Text (#28152; page 10).**



With this combination you'll get all the hardware and components you need to teach both *What's a Microcontroller?* and *Robotics with the Boe-Bot* for the minimum investment.

When you decide to take your class beyond these two tutorials, you can simply reuse the Board of Education and BASIC Stamp 2 module with the next tutorial of your choosing. The biggest problem you'll encounter is trying to convince your students to take the Board of Education off the Boe-Bot chassis!



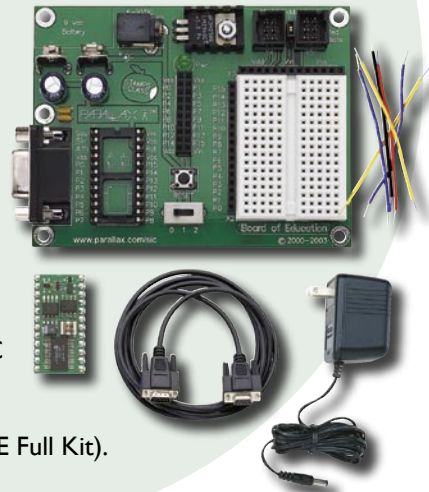
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## Board of Education Full Kit

**Board of Education Full Kit;**  
#28102; \$119.00;  
#28102-EDU; \$101.15

**Board of Education Full Kit (no power supply);**  
#28103; \$119.00  
(for our international customers)

The Board of Education (BOE) Full Kit is the most popular educational kit. Referred to as the BOE Full Kit, it includes the necessary hardware and equipment for the Stamps in Class series. In addition to the Board of Education, it includes the BASIC Stamp 2 module (#BS2-IC), serial cable, power supply, jumper wires, and CD-ROM with software and documentation. This is the platform of choice for the Stamps in Class curriculum or for your own educational experiments. With the BOE Full Kit you'll need only to add a tutorial and parts kit to begin your BASIC Stamp explorations.



If this is your first experience with the BASIC Stamp microcontroller or Stamps in Class curriculum, select the full-featured Board of Education and a BASIC Stamp 2 module (BOE Full Kit).

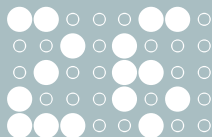
## HomeWork Boards

**BASIC Stamp HomeWork Boards;** #28158;  
Available only as a  
10-Pack \$400.00; or  
20-Pack \$750.00

The HomeWork Board (HWB) was designed to be a low cost BASIC Stamp 2 /Board of Education for take-home or dedicated projects. Its similarity to the Board of Education has allowed the HomeWork Board to become a viable replacement for the BOE/BS2 combination. However, HomeWork Boards are only available through Parallax in packs of 10 units. You should also make note that the HomeWork Board doesn't have servo connections or a power supply jack, so we recommend the BOE if you plan to conquer *Robotics with the Boe-Bot*, *What's a Microcontroller?*, *Basic Analog and Digital*, *Robotics with the Boe-Bot*, *Understanding Signals*, and *Applied Sensors* have been revised to support both Board of Education and HomeWork Board platforms.

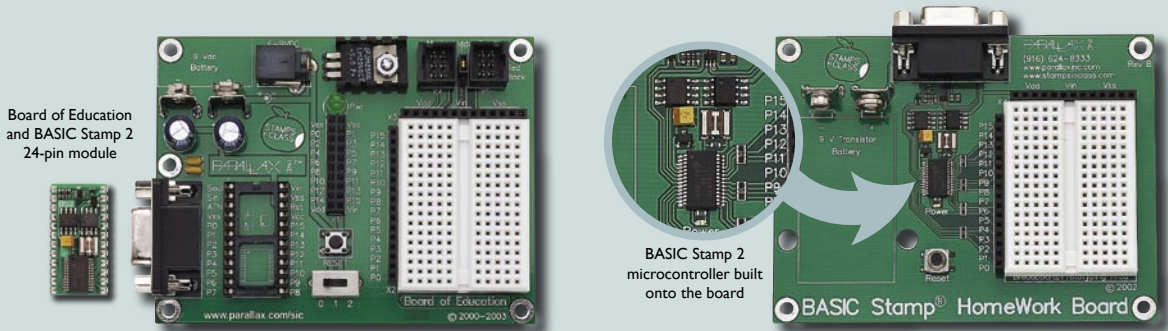


*Educators Note: Using HomeWork boards requires a few technical work-arounds for most Stamps in Class curricula and is considered ideal for student take-home projects and dedicated projects.*



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# Comparison between the Board of Education with BASIC Stamp 2 and the HomeWork Board



The BASIC Stamp microcontroller is most commonly used in classrooms and laboratories in the 24-pin version socketed in the Board of Education. Our Stamps in Class tutorials were originally written with the BS2/BOE in mind. This is absolutely our best hardware for Stamps in Class and our preference for the most versatile user experience.

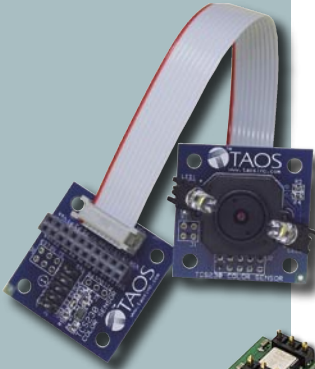
A potential alternative is the BASIC Stamp HomeWork Board, a low-cost board similar to the Board of Education with a BASIC Stamp 2 microcontroller built right into the PCB. The lower cost HomeWork Board makes it ideal for take-home projects and dedicated uses. Read the table below for a comparison of features:

	<b>BASIC Stamp 2 / Board of Education</b>	<b>BASIC Stamp HomeWork Board</b>
Cost	~\$100/each in Board of Education Full Kit (#28102; \$101.15 at educational price)	\$40/each, but available only in 10-packs (#28158)
BASIC Stamp	<b>BASIC Stamp 2 (BS2-IC) 24-pin module may be removed from the board</b>	BS2 module build directly on to the printed circuit board
I/O Protection	None, requires attentive wiring/programming.	220 ohm resistors built into each I/O pin
Size	3" x 4"	3" x 4"
Power Supply	<b>9V battery / 2.1 mm jack for wall-pack provides 5V and unregulated input voltage</b>	9V battery only
Voltage Regulator	LM2940 can sink/source up to 1 Amp, plenty of power for small robotics, hobby and educational projects	LM2936 sinks/source up to 50 mA, enough for small projects unless a second power supply is introduced
Servo Ports	<b>(4) servo connections</b>	None, but may be done on breadboard with 3-pin headers
Support provided in Stamps in Class tutorials	All Stamps in Class books support this hardware.	All Stamp in Class books EXCEPT <i>Advanced Robotis with the Toddler</i> and <i>Elements of Digital Logic</i>

The HomeWork Board may appear less robust, but it's a favorite of many customers and every bit as capable as a Board of Education depending on how you provide power. On the HomeWork Board, the power LED is only lit while the BASIC Stamp microcontroller is running a program, so you could put it in SLEEP/NAP for months and still use the same 9V battery.

# Beyond Stamps in Class: Sensors of interest in education

Educators often purchase a variety of sensors manufactured by Parallax. These sensors are distributed to students for use in their projects or so they can develop code and learn about the different protocols. Measuring a single type of physical property, such as temperature, can be an ideal way to demonstrate multiple sensor interfaces: pulse width, analog, frequency, serial or a non-linear resistive output.



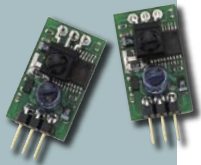
**TCS230 Color Sensor Evaluation Kit (#30054; \$79.00)** - The TCS230 is Texas Advanced Optical Systems color sensor. This sensor has a frequency output for red, blue and green colors.



**Memsic 2125 Dual-Axis Accelerometer (#28017; \$29.00)** - The Memsic 2125 is a low cost, dual-axis thermal accelerometer capable of measuring dynamic acceleration (vibration) and static acceleration (gravity) with a range of  $\pm 2$  g. This is an ideal sensor addition for walking and rolling robots.



**Sensirion SHT1X Humidity Sensor (#28018; \$29.00)** - Humidity is notoriously difficult to measure, but this sensor provides a pre-calibrated synchronous serial output. Ideal for weather greenhouse or environmental-based science educational projects.

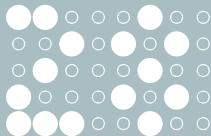


**Infrared Emitter/Detector Pair (#28019; \$14.95)** - Consists of an infrared LED and 38 kHz modulated receiver. This sensor is easily used for object detection up to a distance of one foot or more.



**433 mHz RF Transceiver (#27997; \$95.00)** - Serial interface is ideal for remote controlled robotics.

For more BASIC Stamp compatible sensors and accessories visit our main website at [parallax.com](http://parallax.com).



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[www.parallax.com/sic](http://www.parallax.com/sic)

# Reference Materials

## **Circuit Cellar Magazine**

*Circuit Cellar* strives to offer "Practical, hands-on applications and solutions for embedded-control designers." The magazine is a valuable tool for engineering bound students. Hands on applications cover hot topics which may include everything from embedded networking to GPS systems. The *Circuit Cellar* web site may offer the best possible description: "*Circuit Cellar* enhances the electronic design skills of its readers by offering creative solutions and unique applications through complete projects, practical tutorials, and useful design techniques."

## **Nuts & Volts Magazine**

The information at [www.nutsvolts.com](http://www.nutsvolts.com) offers this overview: "*Nuts & Volts* is published monthly for the hands-on electronics hobbyist. Our magazine covers the fields of analog and digital circuit projects, relevant and emerging technologies, fundamentals, and thought inspiring features on lasers, data security, supercomputing, near space experiments, microcontrollers and a whole lot more." Each issue features the well known *Stamp Applications* column which highlights a new BASIC Stamp project every month.

## **Servo Magazine**

The description for the new *Servo Magazine* (created by Nuts & Volts) is as follows: "Amazing machines are being conceived and built in labs, universities, and even garages all over the world. Whether you want a front row seat or to jump in with your soldering iron and C compiler - *SERVO Magazine* is your ticket in the door. Each monthly issue will inspire, educate, and entertain with feature articles, interviews, tutorials, projects, and sources for parts. Whether you're building your first line-follower or finishing off the perception layer in a positronic brain, *SERVO Magazine* delivers the sharp technical tools you need to stay on the cutting edge."

## **Parallax Web Site**

We're proud of our free downloads and support articles available at [www.parallax.com](http://www.parallax.com). Information is posted categorically and we have highlighted the most popular items.

**Downloads** - software, texts, manuals, documentation

**Educational Downloads** - scope of articles is educational in nature, submitted by outside authors

**Stamps in Class downloads** - SIC texts, translations

**Articles by Outside authors** - industry articles related to the BASIC Stamp microcontroller

**Customer Applications** - over 50 projects featuring the BASIC Stamp module in the areas of Art, Industrial, Robotics, Science, and more



For subscription information, please contact the individual magazines.

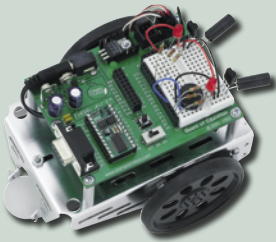


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# Educational Standards and Parallax Stamps in Class Tutorials



*Boe-Bot assembled*

As Parallax Stamps in Class tutorials continue to be used in more computer science, electronics and robotics classes educators have requested that we investigate the applicability of standards to our books. While there are no standards for robotics and microcontroller programming, many educators have used the Boe-Bot and our other texts to cover several standards:

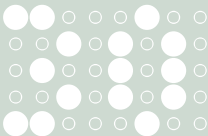
- **Motion** – the study of speed and RPM, acceleration and basic algebra, proven with the interface of accelerometers
- **Heat** – interface a digital thermometer or thermistor to study properties of heat
- **Light** – using photoresistors to study properties of light and infrared sensors as a way to introduce the electromagnetic spectrum
- **Sound** – using the BASIC Stamp module's FREQOUT command to generate music and mixed frequencies
- **Magnetism** – use of Hall effect sensors to study magnetic fields
- **Electricity** – Ohm's law and many properties of electricity



*Often, Parallax equipment is used in advanced courses where students have demonstrated achievement with standards and have an opportunity to apply them with microcontrollers, sensors and robotics.*

## Teacher's Guides and Standards

The current Stamps in Class approach towards correlating with State/Federal standards is to supplement the Teacher's Guides with appropriate comparisons between standards and concepts. At present, educators may download the Teacher's Guides from our Parallax Educators Yahoo Group. The Teacher's Guides change frequently and are updated several times a year. The two most complete Teacher's Guides have been produced for *What's a Microcontroller?* and *Robotics with the Boe-Bot*. After joining the Parallax Educators Discussion Group, you will find the resources in the "Files" Section.



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# How to Fund Parallax Equipment for your Classroom



The core of all successful technology funding opportunities starts with a vision. Next, find a couple of supporters and people who have successfully obtained grants (ask on our Parallax Educators discussion group). Then identify the funding source, which will either result in a grant request following specific guidelines or a plan to be submitted to private funding sources. If your aim is to obtain private funding – which can often be found more quickly - we strongly suggest you identify why they should give you money as well as identifying the benefits to the donor.

On our Parallax Educators Yahoo Group discussion list, we recently asked our educators where they get funding to buy Parallax products. The answers were primarily from high school instructors since college instructors typically ask students to buy the hardware directly from Parallax or through the college bookstore. This list is only a start, but a search on [www.google.com](http://www.google.com) or a query on our discussion groups can identify more options:

## Grant Possibilities

Carl D. Perkins Vocational and Technical Education Act administered by the U.S. Department of Education is a common source of \$2,000 to \$5,000 grants for vocational-technical education programs and is considered quite easy to obtain.

Private donations and companies provide funding based on succinctly-written plans with clearly identified benefits. Amounts vary between \$100 and \$10,000.

National Science Foundation grants launched several programs across the U.S. in which Parallax hardware has been purchased. These programs are aimed at creating robotics curriculum, with funding up to a million dollars.

Parent Teachers Association, enrichment programs, and statewide programs are also typical sources of funding.

Some of the resources which could be helpful include:

*The Foundation Center* **[www.fdncenter.org](http://www.fdncenter.org)**

*U.S. Department of Education* **[www.ed.gov](http://www.ed.gov)**

*National Science Foundation* **[www.nsf.gov](http://www.nsf.gov)**

*National Science Teacher's Assoc.* **[www.nsta.org](http://www.nsta.org)**

*Taking the  
time to get  
your share  
pays off!*



[www.fdncenter.org](http://www.fdncenter.org)



[www.ed.gov](http://www.ed.gov)



[www.nsf.gov](http://www.nsf.gov)



[www.nsta.org](http://www.nsta.org)

# How to place your order with Parallax:



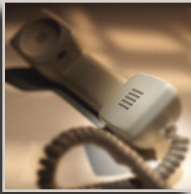
**Online Ordering** at [www.parallax.com](http://www.parallax.com) is the most popular way to order products from Parallax.

*Why do customers shop online?*

- **Order entry process is secure, fast, and easy to understand**
- **Order confirmation and tracking number are sent via email**
- **Exclusive sales and promotions**
- **Educational pricing is readily available**

Online orders may be placed anytime through our secure server on [www.parallax.com](http://www.parallax.com). On-line orders require Visa, MasterCard, or American Express and are shipped UPS only. Orders received before 2 p.m. PST will be shipped the same business day if all items are in stock. Orders received after 2 p.m. will be processed for shipment the following business day (Parallax's regular business hours are M-F, 7-5 PST).

If you are unable to connect to the internet or if you prefer not to order online, we have several alternatives for you. Please feel free to contact our Sales Department at [sales@parallax.com](mailto:sales@parallax.com) or call toll-free 888-512-1024 if you have any questions regarding Parallax ordering policies, prices, and related information.



**Phone Orders** may be placed by telephone during the hours of 7:00 a.m. to 5:00 p.m. Pacific Standard Time. Customers in the continental United States may call toll-free 888-512-1024, and international customers dial (916) 624-8333.

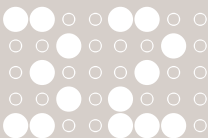


**Fax** your school Purchase Orders to the attention of the Sales Department at (916) 624-8003. Purchase Orders must have a minimum purchase amount of \$100, and contain an authorized signature.

**Mail** us Purchase orders, pre-paid orders with a personal check or money order addressed to:

**Parallax, Inc.**  
**Attn: Accounting Dept.**  
**599 Menlo Drive, #100**  
**Rocklin, CA 95765, USA**

*Note: Please write "Order Enclosed" on the envelope.*



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## Meet our Educational Team!

No, this isn't a twister board game or tic-tac-toe playing square. It's the Parallax Stamps in Class team, up front and personal! So whether you're interested in hosting a course or if you're calling to check on your purchase order, chances are pretty high that you will be working with one or more of the people above. The team consists of members which handle all of the functions of the Stamps in Class program. We are responsible for the following: providing educational technical support, teaching BASIC Stamp Educator's courses, authoring curriculum, editing and formatting texts, processing sales orders, and more! Most of us are closely involved with the educational-related Yahoo! Discussion groups, so now you can match an email address with a picture.

To contact this group, you may send an email to [stampsinclass@parallax.com](mailto:stampsinclass@parallax.com).

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