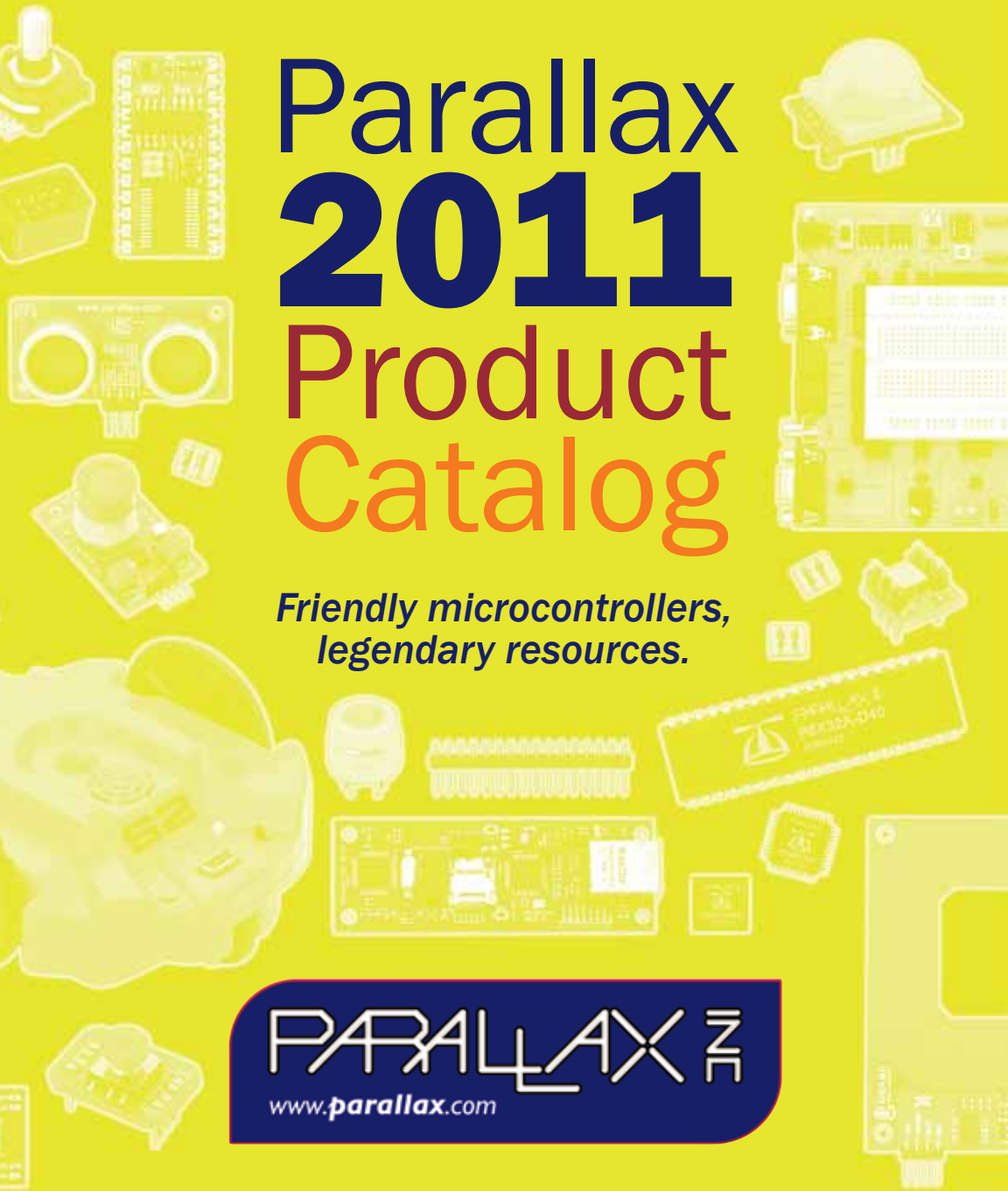
Parallax 2011 Product Catalog

Friendly microcontrollers, legendary resources.



PARALLAX INC

www.parallax.com

PARALLAX INC.
599 Menlo Drive
Rocklin, CA 95765
USA

TELEPHONE:
All callers, including international:
- Office: (916) 624-8333
- Fax: (916) 624-8003

Callers in the United States:
- Toll-Free Sales: 888-512-1024
- Toll-Free Tech Support: 888-99-STAMP

Office/Sales/Technical Support hours are Monday through Friday from 7:00 a.m. to 5:00 p.m., Pacific Time.

INTERNET:
- **Main** - http://www.parallax.com
- **Forums** - http://forums.parallax.com
- **Propeller Object Exchange** - http://obex.parallax.com

E-MAIL:
- support@parallax.com
- sales@parallax.com
- education@parallax.com

Note: As our catalogs are referred to by our customers for many months, we reserve the right to change prices without notice. Prices may vary between our ads and our catalogs. Product description, typographic, pricing, and photographic errors are unintentional and subject to change.

Table of Contents

Propeller™ Multicore Chip

Where is the Propeller used?

The Propeller is used in many industries including manufacturing, process control, robotics, automotive and communications. Hobbyists and engineers alike are finding new uses for this powerful microcontroller every day.

When might you choose to use the Propeller instead of another product?

The Propeller is a good choice over other microcontrollers when a low system part count is desirable due to its ability to provide direct video output and an easy interface to external peripherals such as keyboard, mouse and VGA monitor. Pre-written objects to support many types of hardware also make it an attractive option. All of this plus low cost and a powerful, yet easy language are hard to beat in a world where microcontrollers come in so many flavors that it's hard to make a choice. The Propeller really is an easy choice.

Why should you use the Propeller?

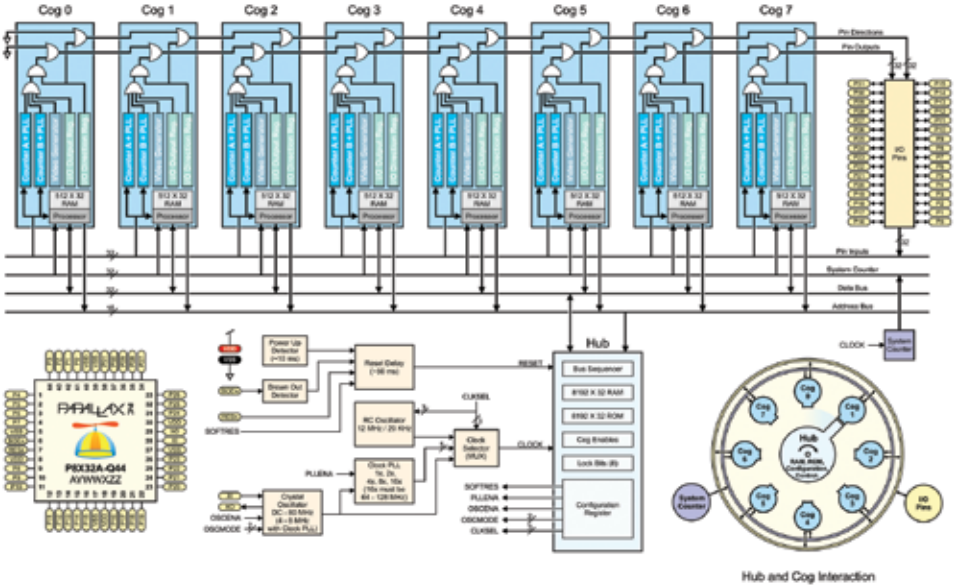
The Propeller Chip can free system designers from the constraints of many modern microcontroller systems in both hardware and software. The Propeller puts the fun back into design and programming while providing the power and flexibility required in today's microcontroller-powered applications.

The Propeller Chip retails at $7.99 (quantity 1). For Propeller quantity pricing see page 4.

Do you remember when programming was actually fun? With eight 32-bit processors in one chip, integrating peripheral devices is suddenly simplified. The Propeller chip gives programmers both the power of true multi-processing and deterministic control over the entire system.

Each of the Propeller chip's processors, called cogs, can operate simultaneously, both independently and cooperatively with other cogs, sharing access to global memory and the system clock in a round-robin fashion through a central hub. Each cog has access to all 32 I/O pins, with pin states being tracked in its own input, output and direction registers. Each cog also has its own memory, 2 counter modules, and a video generator module capable of producing NTSC, PAL & VGA signals. There are two native languages, object-based Spin and low-level assembly, and third-party C compilers as well. Example objects, such as keyboard, mouse, and graphics drivers, come standard with the free Propeller Tool software. Many others, including C objects, are available through the Propeller Object Exchange. With the right objects, using the Propeller is a matter of high-level integration.

A Parallax creation from the silicon on up, the Propeller chip's unique architecture and languages will change the way you think about embedded system design. ***Simplify!***



Hub and Cog Interaction

PROPELLER MULTICORE CHIP	
Power Requirements	3.3 VDC
Operating Temp.	-55 to +125 °C
Processors (Cogs)	8
I/O Pins	32 CMOS
External Clock Speed	DC to 80 MHz
Internal RC Oscillator	~12 MHz or ~20 kHz
Execution Speed	0-160 MIPS (20 MIPS/cog)
Global ROM/RAM	32768 / 32768 bytes
Cog RAM	512 x 32 bits/cog

Propeller creator Chip Gracey (seated) with Parallax Engineer Jeff Martin performing silicon surgery at the FIB machine.

New feature! The Propeller Q&A is a collection of questions and their corresponding answers arranged into categories, listed in a Table of Contents. We recommend that beginners read the first few categories in order, and users with more experience skip around as needed. **http://www.parallax.com/propeller/qna**

Propeller Chips in Quantity

Available as a DIP chip for prototyping, and two different package types for volume manufacturing. With its 8 cogs and 16 configurable counter modules, **the Propeller chip can reduce component count and power consumption in your design, improving overall economy in high-volume production.** We offer price breaks at the quantities shown below; for higher volume orders contact sales@parallax.com.

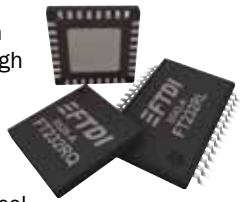
Stock #	Pins	Package Type
P8X32A-D40	40	DIP 0.6 in W
P8X32A-Q44	44	LQFP 10 x 10 mm
P8X32A-M44	44	QFN 9 x 9 mm

Ea@Qty	1	100	500	1000
Price	$7.99	$7.19	$6.39	$5.99

The Propeller Datasheet is available from the 'Downloads' link at www.parallax.com/propeller

FTDI USB to Serial Chips

- **FT232RL - #604-00043; $4.50**
- **FT232RQ - #604-00047; $4.50**



The Propeller chip can be programmed through a serial interface. Use the FT232R series to program the Propeller from a USB port. Entire USB protocol handled on the chip - No USB-specific firmware programming required.

Useful Propeller prototyping components:

256 Kbit (32 KB) Industrial I²C Serial EEPROM - #602-00032; $1.50 - This low-power, electrically erasable memory is perfect for DIP-based Propeller designs or extra data storage.

5.00 MHz Crystal - #251-05000; $1.10 - Recommended for use with the Propeller chip.

6.25 MHz Crystal - #251-06250; $1.50 - This crystal has proven to be a reliable way to increase the speed of the Propeller; if properly used, the crystal can boost the speed of the Propeller microcontroller up to 100 MHz from the original 80 MHz. This will allow for even more processing power capabilities.

3.3 V Voltage Regulator - #601-00513; $1.25 - The LM2937ET-3.3 V Voltage Regulator provides a fixed 3.3 V, 500 mA supply from an existing 5 V (or higher) supply for Propeller microcontroller projects.

5 V LDO Voltage Regulator - #601-00506; $1.25 - This regulator may be used in conjunction with our 3.3 V Regulator to create a dual voltage supply circuit.

Advantages of Using the Propeller -
Reasons to use the Propeller in your product design

"I've built my company around the Propeller chip and find it extremely easy to use and flexible enough to tackle some of the biggest problems we've had. Every one of our products has at least one Propeller chip in it! In a product that costs as much as ours ($1,495), the $6 price per unit is nothing, especially considering the flexibility and code base we base it on, that cost savings alone easily makes up for the unit price difference. We sold 250 units of Wingman at the Oshkosh show and have commitments for 100 per month ongoing."

- William J. Steele, Wingman airplane display developer (see page 8)

Parallax designed the Propeller for product inventors, entrepreneurs, hobbyists and students alike. In a market where microcontrollers are handed to you with a menu of options and configurations, it's sensible that the commercial product designers would ask if the one-size-fits-all Propeller is an appropriate choice for their products.

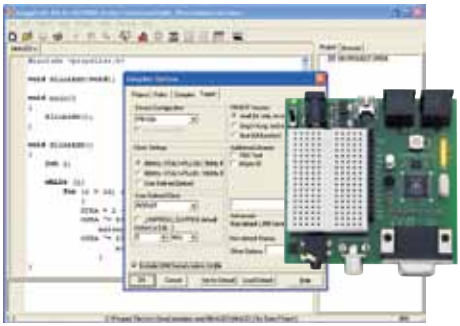
FLEXIBILITY - The Propeller has eight cores and these can be used any way you desire. The Propeller shows this flexibility for a diverse assortment of products like instrumentation, autopilots and robotics, machinery control and renewable energy. These products often have a need for a display, user interface, communication in addition to measurement, control and computation tasks. All of these abilities are nicely partitioned in a Propeller. The requirements of these products vary significantly, so a single-purpose microcontroller with a pre-defined set of peripherals won't provide the product expansion capabilities.

CODE LIBRARY AND ARCHITECTURE - The Parallax Propeller Object Exchange (http://obex.parallax.com) provides source code objects you can use in your product designs. The Propeller's multi-core design and object-based programming means your code modules can be packaged up in tidy, interactive modules. An organized relationship between the Propeller hardware makes it easy to add, modify or remove code objects – objects can run concurrently in their own cogs. Single-threaded architecture is a thing of the past.

SUPPORT AND STABILITY - Parallax's 20+ year business record includes consistent growth and stability. Like our other products, the Propeller is just beginning a many-decade production run. The support offered by Parallax is tremendous, whether via forums, telephone, e-mail or in-person by our Field Application Engineers. We'll work with you, on your terms, to help bring your product to production. And you'll never receive an "End of Life" notice on this multi-core processor.

MANUFACTURING SUPPORT - Parallax Hong Kong manages our own Chinese manufacturing facility. We can manufacture your Propeller product. Contact us for information about this possibility.

PRICE - Low volumes are available in the $6 range with higher volumes (25 K) being available for even less. External component count can also be reduced by using a Propeller. Driving VGA and composite displays are one example.



ICCV7 for Propeller w/Demo Board

- **Standard - #910-32385; $249.00**
- **Non-Commercial - #910-32380; $99.00**

ICC for Propeller from ImageCraft is an ANSI C development tool for the Propeller chip. The IDE features project-based design and supports C86 dialect source and C-based Propeller objects. The Propellent Library is directly supported by the IDE for ease in build-to-run development cycles. Free full-function 45-day demo, then becomes code size limited to 8 K bytes. The Non-Commercial version supports programs as large as 16 K and the Standard supports programs as large as Hub RAM. *Propeller Demo Board is included with both versions (a $79.99 value!).*

FEATURES:

- Compiler/optimizer/assembler/linker
- Libraries and built-in terminal included
- Uses Large Memory Model (LMM) to bypass 2 K byte limits of cog code; typically 5-10x faster than Spin
- Access Propeller multiprocessing and other Propeller-specific features in C

Download a free 45-day trial version of the software at www.parallax.com/propeller

ViewPort Debugging Software

- **Standard - #32388; $59.00**
- **Ultimate - #32386; $149.00**

A premier debugging environment for the Propeller. The tool combines an integrated debugger with powerful graphics that show you what's going on within the Propeller. Monitor variables over time with the built in oscilloscope or change their value while your Propeller is running. Solve hardware problems with the logic analyzer at sampling rates up to 80 Msps. Add intelligence to your programs with the fuzzy logic module or perform simple vision processing.

The Standard version is low-speed (up to 115 kbps) and has debugger. The Ultimate version is high-speed (up to 2 Mbps) and includes debugger, OpenCV, development kit, and designer (customize the graphic instrumentation via drag and drop).

ViewPort can be integrated into any Spin program. It requires one cog and a single line of code at the start of your program. It's easy to get started with plenty of tutorials, videos and documentation. It is also configurable and extensible so you can customize it to your needs.

Free Propeller Software

Propeller Tool Software (Win2K+)

This is the primary development environment for Propeller programming in Spin and Assembly Language. It boasts many features to facilitate organized development of object-based applications: multi-file editing, code and document comments, color-coded blocks, keyword highlighting, and multiple window and monitor support aid in rapid code development. Optional view modes allow you to quickly drill down to the information you need—by hiding comment lines, method bodies, or by showing the object's compiled documentation only. An object's normal code view can quickly be toggled to documentation view to determine what public methods exist and how to use them. Multiple views enable quick interfacing of existing objects to the Propeller application.

Propellent Library and Executable (Win2K+)

- For software developers to add support for the Propeller chip to their projects and for users needing command-line driven Propeller chip support. The Parallax Propellent software is a Windows-based tool for compiling and downloading to the Parallax Propeller chip—without using the Propeller Tool development software. The Propellent Executable provides the ability to do things like compile Spin source, save it as a binary or EEPROM image, identify a connected Propeller chip, and download to the Propeller chip, all via simple command-line switches or drag-and-drop operations. Pictured left; Propellent Executable compiling source code to a Propeller-compatible EEPROM image file.

FREE RESOURCES ONLINE:

Propeller Information Page (www.parallax.com/propeller) Download the Propeller Manual, Datasheet, Propeller Tool, and other software. Links to applications, webinars, contests, events, etc.

Object Exchange (http://obex.parallax.com) Code submitted by customers and Parallax engineers, free for use under the MIT license. Objects for: data storage, displays, motor control, protocols, sensors, math functions, and more.

Discussion Forums (http://forums.parallax.com) Active and diverse community discusses all aspects of Propeller-based circuit design and programming techniques, and shares customer-created projects, and programming and debugging tools.

PROPELLER-CONTROLLED COMMERCIAL PRODUCT

WINGMAN: A Portable EFIS by William J. Steele of VirtualHUD

"For the last several years, I've been designing avionics for aircraft as a hobby. I found the Propeller about 3 years ago and haven't looked back since. I developed the Wingman, a portable EFIS, or Electronic Flight Information System. An EFIS is basically a digital version of the instrument panel in any aircraft. Modern versions actually give the pilot a lot more useful information than the traditional six-pack instruments in older aircraft. The Wingman is designed to give pilots of "less equipped" aircraft that same information.

This is the first and only unit on the market that is completely portable. The prototype has one of Rayman's 4.3 inch Touch screen displays and runs on a single Propeller chip, with 64 K EEPROM and an internal 2 GB SD card. It also has a Lithium-ion battery pack to allow it to run for well over an hour on battery power alone (our testing has shown over two hours depending on the configuration and screen brightness). All of its sensors are built in, including 3 axis accelerometers, 3 axis gyros and a 3-axis compass. It has a 20 channel GPS, but may also connect to an external GPS for additional waypoint and route information. The Wingman uses a bunch of software from the OBEX (http://obex.parallax.com), plus about 10 years of my own software development converted to PASM and a little bit of Spin.

The Wingman is designed to work in conjunction with a handheld aviation GPS to provide a "complete picture" of what the airplane is doing and where it is located, as well as "highway in the sky" symbology to guide the pilot to their destination.

The hardware is wrapped in a padded foam edging to trim it out and fit into a custom-designed acrylic case. The unit is 4.75 x 3.25 x 0.875 inches and weighs about 7 ounces.

I have to say, the further and further I dig into the Propeller, the more I love it. The Object Exchange (OBEX) is wonderful for getting a collective understanding of how everything works. We took a lot of the ideas (and code) and blended them into our software. Most had to be rewritten to fit our particular needs (and space, because we only have 512 longs in each cog). The really cool part is that we still have free space available for additional processing and we're only using 7 cogs right now. That's gives us some breathing room from some future enhancements!

The Wingman is the lowest priced backup Attitude Indicator that I am aware of... and it's the only portable one."

The Wingman EFIS retails for $1,495.
For more info: www.VirtualHUD.com

Propeller 2: Preliminary Feature List

The Propeller 2 multi-core microcontroller is in development. Here is a list of features to look forward to.

GENERAL:
- 32-bit, general purpose multi-core microcontroller
- 8 identical processors (cogs)
- Planned 128-pin SMT package(1) Clock Speed
- 160 MHz planned maximum clock speed(1)
- Internal RC: 20 kHz or 20 MHz (cannot use PLL)
- External oscillator: DC to 160 MHz (without PLL) or 10 MHz to 32 MHz (with PLL) for system clock speed of 160 MHz maximum(1)
- PLL modes: 2x, 4x, 8x, 16x input clock multiplier

PERFORMANCE METRICS:
- 4-stage pipeline
- Most instructions are single cycle
- 1.28 BIPS (160 MIPS x 8 cogs) maximum instruction execution rate(1); assumes that all cogs are running, their pipelines are always full, and only single-cycle instructions are being executed

MEMORY:
- Main memory: 128 KB RAM(2) + 32 KB ROM planned
- Cog memory: 2 KB (512 longs) cog RAM
- Optional external 32-bit addressable SDRAM for run-time data workspace; code space is not extendable
- Non-volatile application and data storage via external SPI EEPROM or SD card
- Cogs can access Main Memory at each hub access window in units of 1 byte, 1 word, 1 long, or 4 contiguous quad-aligned longs.
- Hub access window arrives for each cog in a round-robin fashion every 8 cycles.

CODE PROTECTION AND ENCRYPTION:
- Propeller application and data optionally encrypted in non-volatile storage

POWER SPECIFICATIONS:
- Core voltage: 1.8 VDC
- I/O pin voltage: 1.8 VDC–3.3 VDC
- Current source or sink per I/O: 40 mA
- Total current draw @ 1.8 VDC Core, 3.3 VDC I/O, 25 °C: TBD

I/O:
- 92 I/O pins total: 84 fully general purpose I/O + 8 additional general purpose I/O available after boot-up
- Each I/O pin is planned(1) to have internal:
  - Input ADC
  - Output DAC
  - True or inverted input/output
  - Differential input/output
  - Comparator
  - Schmitt input

COUNTER MODULES:
- 2 counter modules, each with 2 integrated waveform generators, per cog

MATH:
- Hardware multiplier and divider
- Hardware CORDIC system

VIDEO GENERATION:
- Each cog has independent video generation hardware capable of VGA, Standard PAL/NTSC, and HD up to 1080p (at 30 Hz).

SUPPORTED LANGUAGES:
- Propeller 2 Spin and Propeller 2 Assembly
- Propeller 2 Assembly is not fully backwards compatible with Propeller 1 Assembly
- Some Propeller 1 Spin code may need to be ported to the Propeller 2

Note (1): Please keep in mind that these features are planned; implementation within the final product is dependent on layout and other constraints.

Note (2): Main memory RAM size may change due to layout constraints.

BASIC Stamp® Microcontroller

Where is the BASIC Stamp used?

The BASIC Stamp is used in technology education and as an easy-to-program, quick-to-implement solution in many industries including manufacturing, process control, and robotics. Hobbyists and Engineers alike are finding new uses for this powerful microcontroller every day.

When might you choose to use the BASIC Stamp instead of another product?

The BASIC Stamp is a good choice over other microcontrollers when a well-documented module with plenty of free educational tutorials is required. Persons looking to learn programming, sensor control, home automation, and robotics will find the BASIC Stamp to be the perfect tool. Experienced programmers also enjoy the BASIC Stamp microcontroller's simplicity for quick projects.

Why should you use the BASIC Stamp?

For those new to electronics, the PBASIC language is very powerful yet very easy to learn. BASIC Stamp programming is the perfect entry to technology literacy. Parallax offers a wealth of free support, tutorials and resources for learning how to program and design projects with the BASIC Stamp.

The BASIC Stamp is available in module or interpreter chip format. For BASIC Stamp 2 module specifications see pages 12-13.

As a rapid prototyping tool for engineers, an affordable controller for hobbyists, and an easy-to-learn platform for technology students, the BASIC Stamp microcontroller prospers in many fields. Common uses include classroom robotics and lab projects from middle schools to universities, scientific field research tools, process control systems, and custom or lower-volume engineering projects. A wide base of sample applications and source code is available free online.

BASIC Stamp 2 module (#BS2-IC; $49.00)

A BASIC Stamp module is a single-board computer that runs the Parallax PBASIC language interpreter in its microcontroller. The developer's code is stored in an EEPROM, which can also be used for data storage. The PBASIC language has easy-to-use commands for basic I/O, like turning devices on or off, interfacing with sensors, etc. More advanced commands let the BASIC Stamp module interface with other integrated circuits, communicate with each other, and operate in networks.

The free BASIC Stamp Editor Software is the programming environment for all BASIC Stamp modules, and custom devices built with our PBASIC Interpreter chips. A built-in Debug Terminal supports bidirectional (unidirectional on BS1) communication between the BASIC Stamp and the PC during run-time.

PBASIC Interpreter Chips

Pre-programmed with our PBASIC Interpreter, chips are available for every BASIC Stamp model to incorporate into your PCB for production. Available in through-hole (DIP) and surface mount (SSOP and TQFP) package types. Prices are per chip at quantity.

Model	Stock #	1	100	1000
BS1 DIP	PBASIC1/P	$9.99	$6.99	$5.00
BS1 SSOP	PBASIC1XT/SS	$8.99	$6.29	$4.50
BS2 DIP	PBASIC2/P	$16.99	$11.89	$8.50
BS2 SSOP	PBASIC2CI/SS	$10.99	$7.69	$5.50
BS2e DIP	PBASIC2E/P	$12.99	$9.09	$6.50
BS2e SSOP	PBASIC2E/SS	$11.99	$8.39	$6.00
BS2sx DIP	PBASIC2SX/P	$12.99	$9.09	$6.50
BS2sx SSOP	PBASIC2SX-28/SS	$11.99	$8.39	$6.00
BS2p24 TQFP	PBASIC48W/P24	$12.99	$9.09	$5.85
BS2p40 TQFP	PBASIC48W/P40	$12.99	$9.09	$5.85
BS2pe TQFP	PBASIC48W/PE	$12.99	$9.09	$5.85
BS2px TQFP	PBASIC48W/PX24	$12.99	$9.09	$5.85

We also stock compatible resonators and EEPROM chips, and two OEM reference kits:

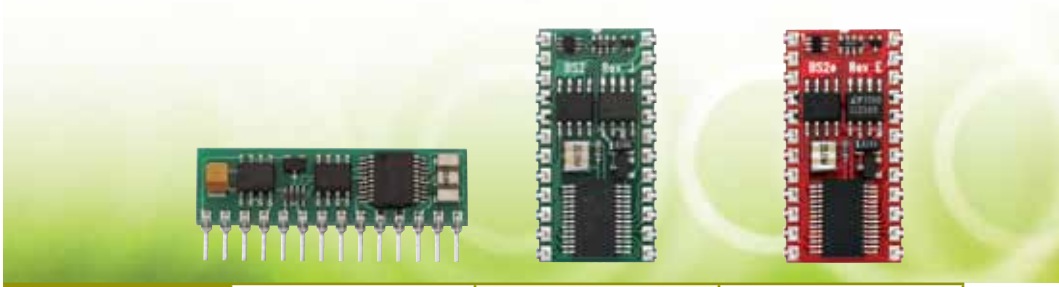
BASIC Stamp OEM Module Kit

- **BASIC Stamp 2 - #27291; $29.99**
- **BASIC Stamp 2sx - #27302; $39.99**

Make it easier to embed a BASIC Stamp into an OEM (Original Equipment Manufacturer) design. The OEM module kit is a through-hole version of a BASIC Stamp module. This fully-functional BASIC Stamp microcontroller is programmed using our Windows Editor just like the BASIC Stamp module.

The kit includes the PBASIC interpreter, EEPROM, resonator, DB-9, and all the resistors and transistors needed. Presented in a 20-pin SIP module format with standard 0.1 inch spacing. The PC board includes labeled component locations with visible traces between parts. PBASIC interpreter and EEPROM are socketed to allow for replacement. Documentation includes a complete bill of materials with three sources and part numbers for each component.

BASIC Stamp Modules

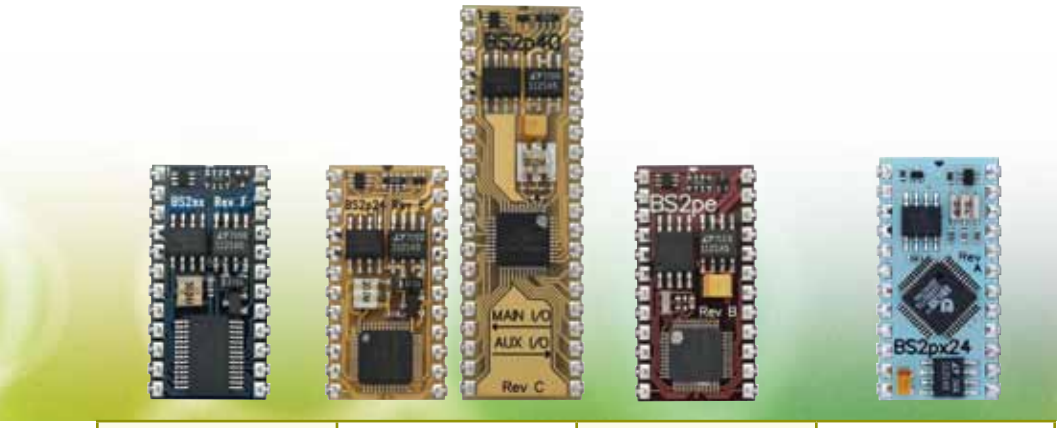


Name of module	BASIC Stamp 1	BASIC Stamp 2	BASIC Stamp 2e
Stock Code; Price	**BS1-IC; $29.00**	**BS2-IC; $49.00**	**BS2E-IC; $54.00**
Processor Speed	4 MHz	20 MHz	20 MHz
Execution Speed (Instructions/Second)	~2,000	~4,000	~4,000
RAM Size	16 Bytes (2 I/O, 14 Variable)	32 Bytes (6 I/O, 26 Variable)	32 Bytes (6 I/O, 26 Variable)
Scratchpad RAM	N/A	N/A	64 Bytes
EEPROM (Program) Size	256 Bytes, ~80 instructions	2K Bytes, ~500 instructions	8 x 2K Bytes, ~4,000 instructions
Voltage Requirements	5-15 VDC	5-15 VDC	5-12 VDC
Current Draw @ 5 V (Run/Sleep)	1 mA/25 µA	3 mA/50 µA	25 mA/200 µA
# of I/O Pins	8	16 + 2 Serial	16 + 2 Serial
Source/Sink Current per I/O	20 mA/25 µA	20 mA/25 mA	30 mA/30 mA
Source/Sink Current per Unit	40 mA/50 µA	40 mA/50 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins
PBASIC Commands	32	42	45

BASIC Stamp 1 Module - Affordable yet capable; perfect for smaller projects or tight spaces.

BASIC Stamp 2 Module – Ideal for beginners yet quite powerful, with a vast resource base and sample code. The BS2 is the core of our Stamps in Class program.

BASIC Stamp 2e Module - Perfect for those who have experience with the BASIC Stamp 2 and would like more data and program space.



BASIC Stamp 2sx	BASIC Stamp 2p24 and BASIC Stamp 2p40	BASIC Stamp 2pe	BASIC Stamp 2px
BS2SX-IC; $59.00	**BS2P24; $79.00** **BS2P40; $89.00**	**BS2PE; $75.00**	**BS2PX24; $79.00**
50 MHz	20 MHz Turbo	8 MHz Turbo	32 MHz Turbo
~10,000	~12,000	~6,000	~19,000
32 Bytes (6 I/O, 26 Variable)	38 Bytes (12 I/O, 26 Variable)	38 Bytes (12 I/O, 26 Variable)	38 Bytes (12 I/O, 26 Variable)
64 Bytes	128 Bytes	128 Bytes	128 Bytes
8 x 2K Bytes, ~4,000 instructions	8 x 2K Bytes, ~4,000 instructions	16 x 2K Bytes (16K for source), ~4,000 instructions	8 x 2K Bytes (16K for source), ~4,000 instructions
5-12 VDC	5-12 VDC	5-12 VDC	5-12 VDC
60 mA/500 µA	40 mA/350 µA	15 mA/150 µA	55 mA/450 µA
16 + 2 Serial	16 + 2 Serial	16 + 2 Serial	16 + 2 Serial
30 mA/30 mA	30 mA/30 mA	30 mA/30 mA	30 mA/30 mA
60 mA/60 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins
45	61	61	63

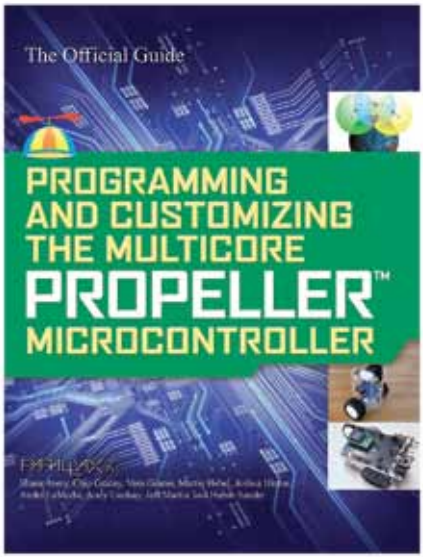
BASIC Stamp 2sx Module - Supports the BS2 command set with more data and program space at more than twice the execution speed.

BASIC Stamp 2p24/40 Modules - More speed and data space, special commands support I/O polling, character LCDs, I²C and 1-Wire protocols. The BS2P40 also features 16 additional I/O pins.

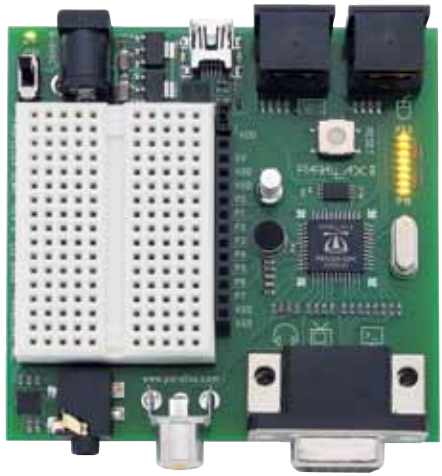
BASIC Stamp 2pe Module - BS2p command set paired with lower power consumption and more memory for battery-powered data logging applications.

BASIC Stamp 2px Module - Our fastest BASIC Stamp microcontroller supports the BS2p command set as well as special I/O configuration features.

PROPELLER KITS & BOARDS



Programming and Customizing the Multicore Propeller Microcontroller: The Official Guide - #32316; $29.99 - Parallax brings together McGraw-Hill and 9 experienced authors to write 12 chapters on the many facets of multicore programming with the Propeller chip. It begins with an introduction to the Propeller chip's architecture and Spin programming language, debugging techniques, and sensor interfacing. Then, it introduces 8 diverse applications, ending with a speech synthesis demonstration written by the Propeller chip's inventor, Chip Gracey. Softcover; black and white printing; approximately 500 pages. ISBN 9780071664509



Propeller Demo Board - #32100; $79.99 - The Propeller Demo Board visibly demonstrates the Propeller chip's varied capabilities in a compact and fun platform. You can use it to learn Propeller programming and then develop full-blown applications which generate video and sound and utilize mice and keyboards. Power supply and USB loading circuitry is provided for you. Eight unused I/O pins are available for experimentation. Dimensions: 3 x 3 in (7.62 x 7.62 cm) **Power supply sold separately (#750-00009; $9.99).**

FEATURES:

- On-board P8X32A-Q44 Propeller chip
- 24LC256-I/ST EEPROM program storage
- Replaceable 5.000 MHz crystal
- 3.3 and 5 V regulators with on/off switch
- VGA output and TV output
- Stereo output with 16 Ω headphone amp
- Electret microphone
- Two PS/2 connectors
- Eight LEDs (share VGA pins)
- Pushbutton for reset
- Big ground post for scope hookup

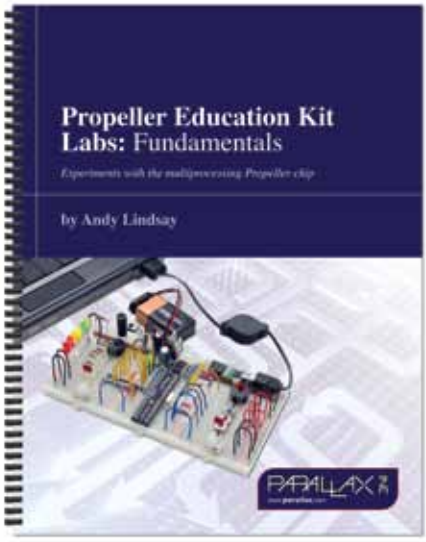
Propeller Starter Kit - #32300; $99.99 - This kit pairs the comprehensive Propeller Manual (alone; #122-32000; $34.99) with the highly capable Propeller Demo Board (facing page) for an attractive savings. By following the steps in the Spin Tutorial that is included in the free Propeller Tool Software's Help file, you will get a step-by-step introduction to programming on the Propeller Demo Board. This board is pre-wired to connectors for interfacing with devices such as a mouse, keyboard, TV or VGA monitor, and speakers, and is also configured for immediate use by many objects from the Propeller Object Exchange. *USB A to Mini B cable included.*

Power supply (sold separately) - #750-00009; $9.99

Prop Plug - #32201; $14.99 - Provides a USB-to-serial port connection that is convenient for programming and communication. Capable of asynchronous communication at up to 3 megabaud with both 3.3 and 5 V devices. Slips onto a 4-pin, 0.1 in. spaced header, allowing PCBs and breadboards to provide in-circuit programming capability. USB A to Mini-B Retractable Cable is included.

Prop Clip - #32200; $14.99 - Provides a USB-to-serial port connection that is convenient for microcontroller programming and communication. The Prop Clip grips onto the edge of a PCB, connecting to the board's four 0.1 inch spaced, plated-through holes. This allows OEM boards to be manufactured with in-circuit programming capability without the extra cost of additional components or labor. Make connectors on products that you mass produce, and field upgrades can use the Prop Clip. USB A to Mini-B Retractable Cable is included.

Propeller Peripherals Kit - #32311; $99.99 - Three I/O peripherals for your Propeller development boards! The Propeller chip is capable of reading input from a standard PS/2 keyboard and mouse, as well as sending output data to a PAL/NTSC A/V display. Example keyboard, mouse, and display driver objects are provided with the Propeller Tool software.



"My Electrical Engineering students are introduced to both the Propeller and common single-core microcontrollers during their microprocessor course. For their final project, they are permitted to use any microntroller they want. ***The vast majority choose the Propeller.***"

Dennis Dahlquist, Professional Engineer and Faculty at California State University, Sacramento

Propeller Education Kit - $99.99

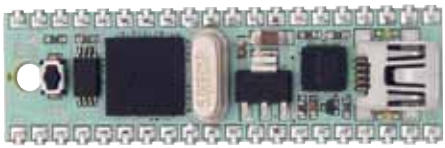
- **40-Pin DIP Version #32305**
- **PropStick USB Version #32306**

A perfect way to learn Propeller programming! With its 8 parallel-processsing cogs, the Propeller chip's unique design makes a variety of otherwise difficult microcontroller applications relatively simple. This kit features breadboard-friendly versions of the Propeller chip, EEPROM and other core components making it easy and inexpensive for students to experiment while being able to replace parts as needed. The included Propeller Education Kit Labs: Fundamentals book is a comprehensive series of labs covering Setup and Testing, I/O and Timing, Methods and Cogs, Objects, and Counter Modules and Circuit Applications.

The 40-pin DIP Version includes a Propeller 40-pin DIP microcontroller "plus" all the electronic components and connectors for a fully functional system on a breadboard. Circuit mistakes aren't so scary with the 40-pin DIP version because each part is inexpensive and easy to replace.

The PropStick USB Version includes a Propeller microcontroller module with EEPROM program memory, voltage regulator, oscillator and socket, reset button, and USB mini B connector for programming and bidirectional PropStick USB to PC communication. All the components you need on one handy module. Just connect power and USB cable, and it's ready to go.

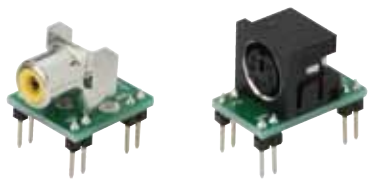
Propeller Education Kit Labs: Fundamentals book (alone) - #122-32305; $19.99



PropStick USB - #32210; $79.99 - The PropStick USB is a rapid development tool for the Propeller chip which provides access to all 32 I/O pins on a 0.1 inch pin spacing format. The 5.00 MHz crystal is socketed for replacement. This module is intended to be used in a breadboard or other through-hole design, and is also sold inside the Propeller Education Kit (facing page) for use with the Propeller Education Labs.

FEATURES:

- Propeller P8X32A-M44 chip
- 32 kB 24LC256-I/ST EEPROM
- FTDI FT232RG & mini USB connector
- USB data transfer indicator LEDs
- 5.00 MHz crystal in a removable socket
- 3.3 V, 500 mA voltage regulator
- Reset pushbutton switch
- USB A to Mini-B retractable cable included



Breadboard Adapters - $4.99

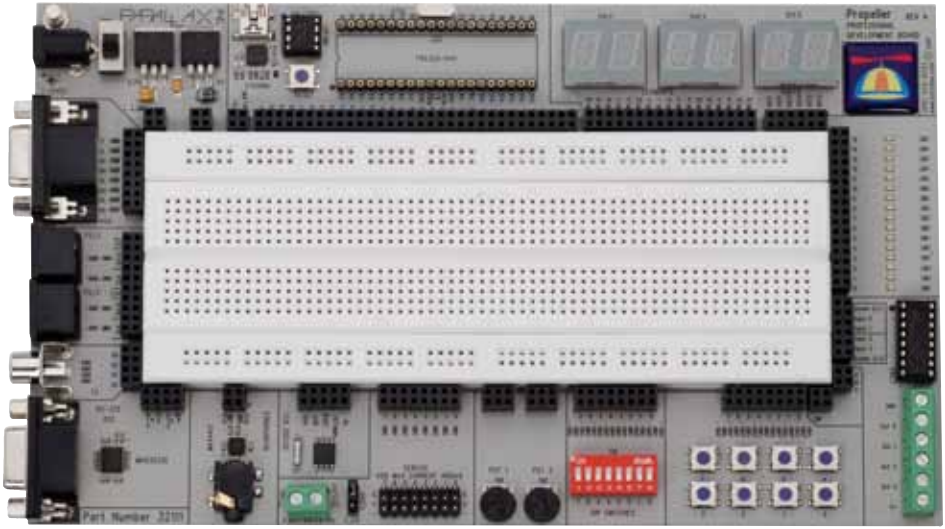
- **RCA to Breadboard - #28050**
- **PS/2 to Breadboard - #28060**

Excellent for use with the Propeller Education Kits to enable the connection of A/V displays and computer mice or keyboards. These small modules connect easily to breadboards, protoboards and perfboards with 0.1 inch hole spacing.

VGA-PS/2 Adapter Board Kit - #28075; $12.99 - Add VGA, Keyboard and Mouse connections to any breadboard project or prototype. All surface-mount components are in place; only soldering of through-hole components is required. The I/O connections are designed to line up with P16 through P27 on the Propeller chip. When using these I/O pins, this board is directly compatible with the Keyboard, Mouse and VGA objects used on the Propeller Demo Board.

NES Gamepad Controller Adapter- #32368; $4.99 - This convenient adapter makes it easy to connect up to two NES-style gamepad controllers to a breadboard or through-hole board project. The printed circuit board has two Nintendo gamepad compatible sockets routed to a dual row of pins for stability, with data connection indicator LEDs and built-in series resistors for I/O pin protection.

*Also see the **SD Card Adapter Kit** (#32313; $14.99) and **micro-SD Card Adapter** (#32312; $14.99) on page 69.*



Propeller Professional Development Board; #32111; $149.99 - A high-quality, fully-integrated development platform for the Propeller chip. A wide variety of typical I/O (LEDs, buttons, etc.) devices and circuitry are built into the PPDB, providing the developer with an ideal platform for rapid Propeller chip development. A 40-pin socket allows easy development and replacement using a through-hole version of the Propeller chip.

FEATURES:

- 40-pin DIP socket for Propeller chip (#P8X32A-D40, sold separately)
- 32K EEPROM (24LC256) in socket
- Socketed crystal (5 MHz included)
- 6-digit, 16-seg LED display (blue, RHDP)
- 16 blue LEDs
- L293D quad push-pull driver
- Eight push-buttons and eight DIP switches
- Two potentiometers (10 K)
- Eight servo headers with selectable internal/external voltage source
- VGA connector
- DS1302 real-time clock with backup battery input (battery not included)
- Stereo headphone amplifier with 1/8 in (3.5 mm)\stereo phone jack
- RS-232 line driver (MAX3232E)
- RCA jack for TV/Composite video output
- Two PS/2 connectors for mouse/keyboard interfacing
- 2.1 mm barrel power jack & power switch
- 3.3 and 5 V power supply connections, and ground terminal
- On-board USB Interface (Mini-B, 5-pin)
- 9 x 5.25 x 0.75 in (23 x 13.5 x 2 cm)
- Operating temperature range: 32-158 °F (0-70 °C)

A Propeller 40-Pin DIP chip is included.

USB cable (A to Mini-B; #805-00006; $6.99) and power supply sold separately. 12 V 1 A power supply (#750-00007; $9.99) recommended to cover the widest range of possible uses.

P8X32A-Q44 SchmartBoard Kit - #27150; $39.99 - **Assembly required.** Learn how to surface solder! SchmartBoard technology makes surface mount soldering easy. Once completed, the board will host the Propeller on a convenient development platform, allowing access to all 32 I/O pins of the chip. Kit includes surface-mount and through-hole package types for some components, offering a soldering choice and challenge.

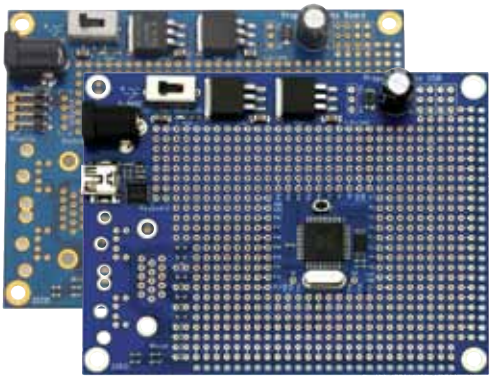
Propeller Backpack - #28327; $39.99 - Compact, multipurpose Propeller-based module that is optimized for audio and video applications. Plug the Backpack into a standard 3-pin header using an LCD Extension Cable (page 74) and communicate using a simple serial protocol. NTSC video monitors can display characters sent by your program – in color, in selectable windows, and selectable character sizes. Dimensions: 1.5 x 1.35 in. (38.1 x 34.3 mm).

Quickly and easily expand the capabilities of your Propeller Platform with any variety of Add On modules available from www.gadgetgangster.com!

NEW! Propeller Platform USB - #32208; $49.99 - Combining a 64 kB EEPROM, 5 Mhz removable crystal, 1.5 A power regulation, USB, and a microSD card slot on a compact, breadboard and protoboard friendly module, the Propeller Platform USB is an easy-to-use development tool for the Propeller. All 32 I/O is available via pin sockets along with 3.3 and 5 V regulated power. Dimensions: 2.8 x 2.5 in (7.1 x 6.4 cm)

EXPANSION OPTIONS:

- Open-Source: Download layout templates in Eagle, Diptrace, or ExpressPCB to de sign your own modules
- Check out Add On modules available for prototyping, video, Ethernet, and more from www.GadgetGangster.com
- Power supply and USB cable not included



Propeller Proto Board

- **Serial Version - #32212; $24.99**
- **USB Version - #32812; $29.99**

Low cost, high quality boards for permanent Propeller chip projects. Serial version omits the USB programming interface; Prop Plug (sold separately) is needed. USB version requires only a USB A to Mini-B cable to connect to PC (sold separately). Dimensions: 3.05 x 4 in (7.75 x 10.16 cm)

FEATURES:

- On-board P8X32A-Q44 Propeller chip
- 64 KB EEPROM (program & data storage)
- LM1086 3.3 & 5 V regulators provide up to 1.5 A w/input power supply of 6-9 VDC
- Three-position power switch (off, logic power, power to logic and servo ports)
- Unplated row of holes along perimeter provide stress relief to off-board connections
- Sockets for 4 servos
- Removable 5 MHz crystal

Blank 3x4" Proto Board - #45305; $4.99

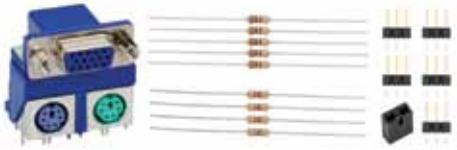
- Designed for maximum prototyping space. Has socket locations for 24 3-pin headers. The four banks of 3-pin headers can be ganged together to connect 24 servos or kept separated for voltage isolation. The 2-pin headers are for connecting the supply rails of the separate banks together. Same footprint and mounting holes as Propeller Proto Boards and the Board of Education.

Spin Stamp - #SS1-IC; $49.99

- Includes a Propeller, 3.3 V regulators, 32 KB EEPROM, and 10 MHz crystal oscillator. Module fits in boards designed for a 24-pin BASIC Stamp. Not intended as a direct drop-in replacement as BASIC Stamp and Spin Stamp have differing voltage requirements. **Prop Clip (sold separately; page 15) is required to program the Spin Stamp.**

Propeller Proto Board Accessory Kit - #130-32212; $14.99

- Includes all the parts necessary to connect VGA, keyboard, mouse and servos to Propeller Proto Boards.



NEW! Parallax Multi-Board Enclosures

- **Clear - #721-32212; $19.99**
- **Blue - #721-32216; $19.99**
- **Red - #721-32214; $19.99**
- **Black - #721-32218; $19.99**

Protect your circuits and provide an effective and robust way in which to display them. These laser-cut acrylic enclosures are designed for use with the:

- Propeller Proto Board - Serial (page 20)
- Propeller Proto Board - USB (page 20)
- Super Carrier Board (page 33)
- Board of Education - Serial (page 31)
- Board of Education - USB (page 31)

The enclosures come in four colors: Clear protects your circuitry and provides the highest visibility, you can see everything. Transparent Blue still allows you to see everything, yet gives your project an understated elegance. Opaque Red and Opaque Black completely hide your project, except for what you can see through the pre-cut access ports; such as the power switch, power jack, and the programming connector.

There are three additional pre-perforated access portals, for projects that require keyboard, mouse, or VGA connectors. Removing these “knockouts” is optional. Dimensions: 4.5 x 3.5 x 2.0 in (11.4 x 8.9 x 5.1 cm)

FEATURES:

- Laser cut 1/8 inch thick acrylic to protect and show off your projects
- Includes all required hardware for a complete package
- Pre-cut “knockouts” provide access to additional (optional) features of Parallax development boards

The Propelled Sumo 2010

A Student Adventure in Controls and Programming by Brad Olson, CodeRed Robotics Team Instructor

Robotics is a great vehicle for teaching and reaching high aptitude students. This spring I found myself asking, “Can 12-year-olds, in the course of the summer, learn to program with a text language, on real silicon? Can they begin to understand basic control and sensor systems? Can I find an affordable means for them to explore these topics?”

The answer is yes to all the above. I credit the multicore Propeller with enabling us to run a multi-pace classroom; the end result was a successful and affordable educational experience.

Multi-pacing was done by making layers in the lessons. For instance, I put before them the challenge of making Propeller-based sumo robots navigate around a square of foam-cup pylons. Some teams accomplished this quickly, others needed more help. All got a short description of how servos work, how to wire them up correctly, and a peek at how control pulses actually look on an oscilloscope. Advanced students puzzled out how this servo driver code actually works, and I gave them the challenge of tweaking the driver so that their robot would drive straighter. Whose robot can stay on the line of black tape for 5 feet? 10 feet? 20 feet? That kept them busy until everybody else succeeded in navigating the cups.

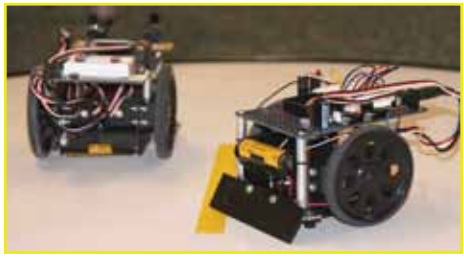
Another really nice feature of Propeller multicore development is self-monitoring and rapid feedback. With the USB interface and some very clever use of one of the Propeller’s cores, students can see what is going on in the microprocessor without time-consuming or expensive component additions. This is very practical stuff - when we put a line sensor or a light sensor or a gyroscope on a robot, students can very quickly look at raw values from the sensor, or at various degrees of processed values. They could visualize what each sensor was “seeing” in the environment and strategize how they wanted to use that information.

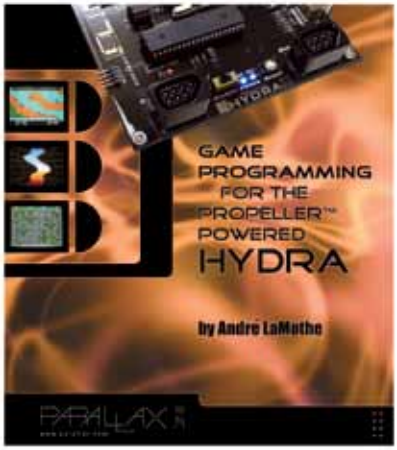
The Propeller’s high-level language, Spin, provides modern constructs that really assist the classroom. It takes a very no-nonsense, high-efficiency approach to objects and encapsulation. Those used to programming a desktop computer will take these sort of language features for granted, but they’re not always available in the embedded world, in a way that is lucid and learnable. With the Propeller chip’s multiple cores, I can teach young programmers how driver code actually works in a high level language. We can look at a servo pulse generator and say, “All right, this is a simple machine that counts time and sends out pulses. We understand how it works, now we’ll ask one cog to take care of that while we move our attention to how we want the servo to actually move.”

I’ve used interrupts and taught others how to use them for 20 years. I find them second nature, and sometimes I miss them on the Propeller, but not near as much as I enjoy having a simple, deterministic cog to hand tasks off to when I’m programming other processors. There is something incredibly powerful about seeing a seventh grader grasp the rudiments

of concurrent processing in their fourth week of programming. The Propeller has students thinking naturally about concurrency, and that corresponds very well with controls and robotics programming. That is a huge step forward.

I'm less concerned with students learning a particular language than learning how to structure programs, how to think clearly, how to separate control logic into reusable layers. I can't think of anything that I taught with Propeller and Spin that will go to waste on these kids. Some of them are already smoothly making the transition to other robotics competitions.

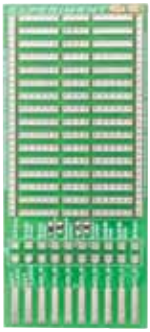




Propeller-Powered HYDRA Game Development Kit - #32360; $159.99

- Develop games, graphics, and media applications with the Propeller-powered HYDRA Game Console. For beginner to intermediate coders, you need only basic programming experience in any BASIC or C-like language. All of the hardware and software you need is included, along with the comprehensive book on game programming for the Propeller in Spin and assembly language entitled Game Programming for the Propeller Powered HYDRA. Within the book, the HYDRA hardware is covered in detail with schematics, descriptions, and tips allowing you to take full advantage of its resources, including its expansion port and game card. Note: Printed book is black and white.

Kit comes complete with HYDRA system, book, 128 K Memory Expansion card, Blank Experimenter card, mouse, keyboard, gamepad, video and USB cables, power supply, CD, and more!



All HYDRA cards fit into the 20-pin expansion interface on the HYDRA board.

HYDRA Blank Experimenter Card - #32362; $7.99 - Large through-hole prototyping area with enough space to fit a single 16-pin DIP device or smaller 8 and 14-pin DIP devices.

HYDRA 128 K Memory Expansion Card - #32361; $14.99 - More space for your games and applications. Comes with 128K serial EEPROM for non-volatile storage. No special programming needed, simply insert the card, program the HYDRA, and the program is stored on the card's first 32K. Use the remaining 96K for data and/or other application data generated in real-time.

HYDRA Xtreme 512 K SRAM Card - #27935; $49.99 - Transform the HYDRA into a full featured 32-bit computer that can host large programs, operating systems, interpreters, compilers, and more advanced games and graphics applications. The Lattice CPLD can be re-programmed with an 3rd party programmer or one your build (instructions included). By re-programming the CPLD, you can literally change the "personality" and behavior of the HX512 altering it to suit your needs as well as using the HX512 as low-cost CPLD development kit (development tool included on CD-ROM). In addition to the hardware is a complete software API suite consisting of both a SPIN based API and highly accelerated ASM API.

HYDRA SD-MAX Storage Card - #27960; $49.99 - Completes the HYDRA system by expanding the capabilities of the HYDRA to read and write SD cards. The HYDRA SD Max card also comes equipped with a 128K EEPROM on-board, so driver firmware can be loaded right on the card.

A 1 GB SD card pre-formatted FAT16 and an e-Book (*.PDF) are included. The manual covers SPI (serial peripheral interface), SD protocol, as well as a complete treatise on DOS FAT16 file systems to get you up and running with SD card media. With this knowledge you will be able to write your own low level drivers or interface your SD cards with the PC. Additionally, a complete SD card driver API is included with source code and examples along with detailed explanations and tutorials in the manual.

NEW! Spinneret Web Server - #32203; $49.99 - The Parallax Propeller microcontroller teamed with the WIZnet W5100 Ethernet controller provide an ideal chipset for low-cost, low-power embedded Ethernet applications. The Propeller microcontroller's multicore architecture and the W5100's hardware Ethernet stack allow a new level of parallelism and data throughput for robust and reliable embedded network applications.

Visit www.parallax.com/go/spinneret

The Spinneret Web Server may be small—at less than 1.5 x 4 inches—but it is a feature packed development platform. The built-in MicroSD card socket and real-time clock allow ample room for time-stamped file and data storage, and the oversized EEPROM can store non-volatile data for use when there is no MicroSD card present.

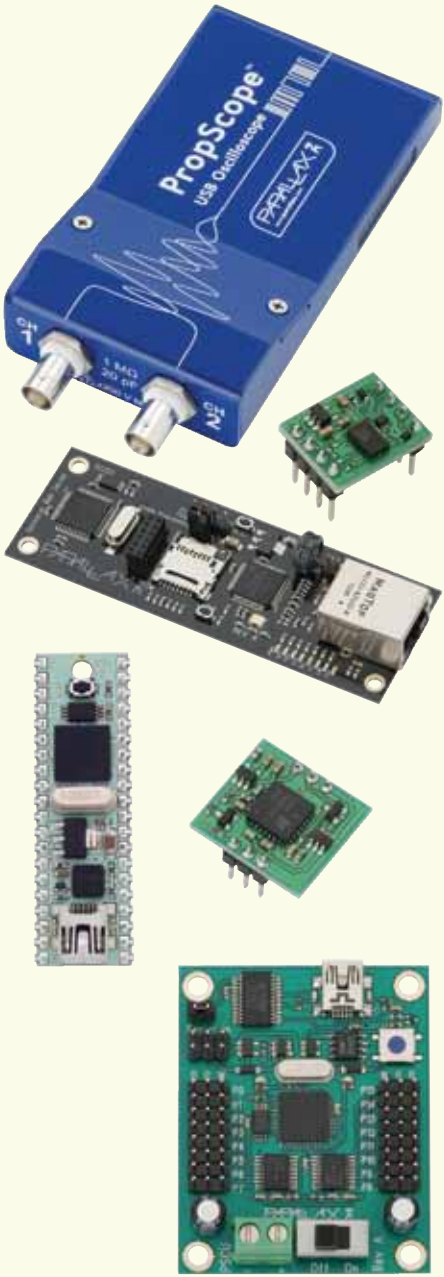
As an open-source hardware design, all design files—including layout, schematics, and firmware—are available under licenses that allow free distribution and reuse. This means that the Spinneret Web Server's design can be incorporated into new applications royalty-free and without a non-disclosure agreement.

SPINNERET WEB SERVER DESIGN CONTEST
A partnership between Parallax and WIZnet - $5500+ in cash prizes!

Design a project using the Spinneret Web Server that performs a useful function and demonstrates your technical abilities. During the design process cooperate with others on the Spinneret Web Server forum and work together to develop designs and code common between projects. This design contest aims to promote the emerging open-source hardware community by encouraging the use of good open-source design practices, cooperation, and proactive sharing of new designs. **Last day to get a project ID is May 31, 2011.**

Visit www.parallax.com/go/spinneret for details.

Open-Source Hardware Designs



The majority of the products created at Parallax include design files that are distributed, free of cost, from our web page. We encourage others to freely use and modify the circuits that we have designed and to integrate them into their own projects, whether for personal or commercial use. For this to occur, copyright law requires us to explicitly grant redistribution rights.

We have been releasing code for the Propeller under the MIT license, and all code posted on the Propeller Object Exchange whether originating from us or a third party, is required to be released under the MIT license. (See http://obex.parallax.com/license/) The MIT license explicitly allows redistribution of software, but it does not apply to hardware designs.

To encourage the reuse of our designs, especially in open-source hardware projects, we will begin to release design files, whenever possible, under the Creative Commons Attribution 3.0 license. (See: http://creativecommons.org/licenses/by/3.0/us/) This will allow anyone to use, modify, and distribute the designs without explicitly receiving permission from Parallax.

Unofficial Propeller Expo

For the past two years, in conjunction with Jeff Ledger (OldBitCollector on the Forums), Parallax has hosted the Unofficial Propeller Expo West at our headquarters in Rocklin, CA. We look forward to many future Expos and hope you can join us at the next UPEW.

Jeff Ledger's report from 2010's UPEW:

As I write this it's around 1 p.m. EST. I'm nursing my third cup of coffee having adjusted to PST and feeling like it's much earlier. I can sum up UPEW 2010 in on word, AMAZING. The atmosphere of the expo was electric. As someone who loves sensory overload there was simply something exciting to look on nearly every square foot of table space. Being hosted at Parallax simply intensified the effect.

Demonstrations started at 11:30 and ran until dinner time. Each demonstration was given twenty minutes with an additional five minutes to wrap up. All were excellent! The topics varied from Propeller robotics to BASIC. If you have never spoken in front of people before UPE is a good place to start.

As the expo entered the early evening hours, things began to slow down a bit. Various projects began emerging with folks working on code, robots, and other projects. A good number of attendees stayed on into the night until around 3 a.m. when five brave souls kept the expo candle burning until folks began returning Sunday morning. Looking at the pictures taken Sunday, your host begins to resemble an unshaven raccoon after not sleeping for 30 hours.

All photos on these pages were taken at the UPEW 2010 by Madison Gilliland.

Two additional demonstrations were given Sunday. Mike Green gave a lesson on the modification of FemtoBASIC, and Rick Galinson brought his amazing presentation of various Hollywood, behind-the-scenes stuff and the paintball Gatling gun.

We were able to hook up a live feed of the Expo streaming on the web and had a constant 30 people connected from all over the world, with the numbers rising to 50+ during Chip's talk, to 14 at 3 a.m. in the morning. One of our brave souls fell asleep for twenty minutes around 4 a.m., so naturally we turned the camera toward him. A chatroom included on ustream.tv added to the event as we could chat with folks online and even relay questions to the speakers.

Like I said: AMAZING. I'm not sure how the next expos will ever top this, and yet I know they will. We are already in the planning stages of adding more improvements and features to the next events. Thank you for allowing me to be your host. I'm humbled to be allowed to facilitate these events for such amazing folks.

BASIC Stamp Discovery Kit - $159.99

- **Serial Version (w/USB Adapter & Cable) #27207**
- **USB Version #27807**

Our most popular kit for getting started with BASIC Stamp microcontroller programming and experimentation. Kit includes: BASIC Stamp 2 module, Board of Education, *What's a Microcontroller?* Parts & Text, *BASIC Stamp Manual*, and programming cable.

The included *What's a Microcontroller?* text contains clear explanations, defines electronics terms in a friendly manner, and most importantly builds your confidence so you can start building your own electronics inventions. You may use your Board of Education with the other parts and text kits in our Stamps in Class series.

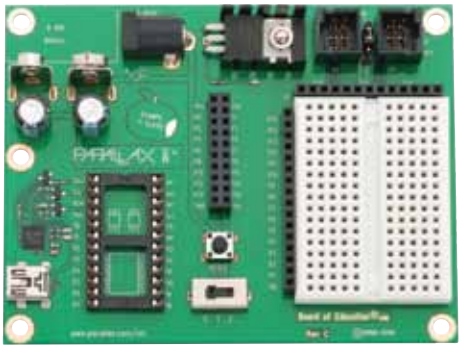
LEARN TO:

- Send signals with blinking LEDs
- Sense contact with pushbuttons
- Read a dial using a potentiometer
- Measure brightness with a light sensor
- Control a servo motor
- Make music on a piezospeaker
- Display data on a 7-segment LED
- Expand your projects with peripheral ICs

What's a Microcontroller? (WAM)

- **Text - #28123; $25.99**
- **Parts Kit - #28122; $45.99**
- **Parts & Text - #28152; $69.99**

This introductory microcontroller programming text introduces downloading PBASIC code to a BASIC Stamp module, building a circuit on a breadboard, and both simple and advanced circuits with LEDs, tact switch, pushbuttons, and a servo. It's a starting point for middle school to college level students (even a background reference for higher levels). The activities in this text are designed to introduce the student to many basic principles in the fields of computer programming, electricity and electronics, mathematics and physics. WAM employs 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. Visit www.parallax.com/go/WAM.

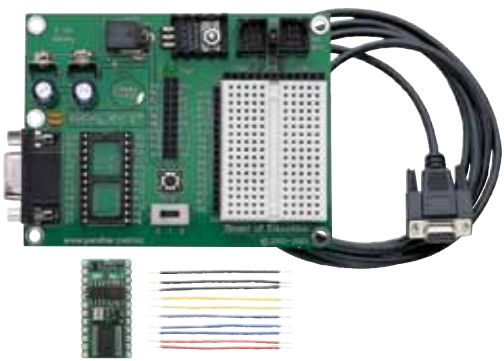


Board of Education - $69.99
- **Serial Version - #28150**
- **USB Version - #28850**

The Board of Education (BOE) was designed in coordination with our educational customers to teach microcontroller programming. The majority of the Stamps in Class (SIC) student guides require a BASIC Stamp 2 module with a Board of Education development board. Even if you aren't using our curriculum, the ease of use and expandibility make the BOE an ideal project board for BASIC Stamp 2 microcontroller experimentation.

Note: BASIC Stamp 2 module not included. Purchase one separately (BASIC Stamp 2 module - #BS2-IC; $49.00) or find a starter kit which matches your needs. Potential options with a BASIC Stamp 2 module (BS2-IC) include the designed-for-education BOE Full Kit (#28103) and the most comprehensive BOE-based selection, the BASIC Stamp Discovery Kit (#27207)

FEATURES:
- Mechanically interlocked power supply to prevent dual connection of wall-pack and 9 volt battery
- DB9 connector for BS2-IC programming and serial communication during run-time
- P0 - P15 I/O pins, Vdd and Vss connections brought adjacent to 1.375 x 2 in (35 x 51 mm) breadboard area
- Female 10-pin dual row connector for optional AppMods
- On-board regulator delivers up to 1 amp of power for larger projects
- Jumper selection of servo power: regulated (Vdd) or unregulated (Vin)
- Three-position power switch allows various powering options for programming without providing power to servo connectors



Board of Education Full Kit - $99.99
- **Serial Version - #28103**
- **USB Version - #28803**

A concise package of all the hardware you need to begin building projects with the BASIC Stamp. Everything is included except for a power supply, components and parts to build projects. If you plan to purchase the Stamps in Class parts and text selections or if you have a workshop full of components, then this is the right kit for you. **Includes a Board of Education development board, BASIC Stamp 2 module, jumper wires, and a programming cable.**

HomeWork Board (10-Pack)

- **Serial - #28158; $399.00**
- **USB - #28188; $399.00**

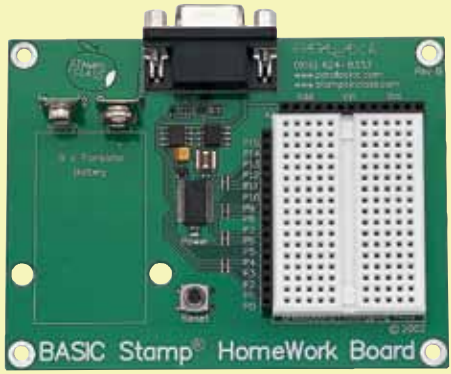
Serial HomeWork Board (w/USB Adapter) is also included in BASIC Stamp Activity Kit (lower right).

Educators who want to combine low cost with the high functionality of the BASIC Stamp 2 module on an educational carrier board have a solution in the HomeWork Board, available only in packs of 10, with a discount for 2 or more 10-packs.

The HomeWork Board consists of a surface-mounted BASIC Stamp 2 on a 3 x 4 inch printed circuit board. The board includes a 9 V battery clip, DB-9 connector and voltage regulator, giving the option for +9 volts or regulated +5 volts for your projects. This is similar to the Board of Education, yet it has no servo connectors and no 2.1 mm jack for wall power. Four rubber feet are included for each board.

The running LED is connected to the BASIC Stamp module's EEPROM clock line, illuminating the LED only if the BASIC Stamp microcontroller is running. If the BASIC Stamp module is put in SLEEP mode, the power LED will turn off, possibly enabling months of operation from a single 9 V battery.

Designed for those instructors not willing to send the Board of Education with BASIC Stamp 2 module home, this low-cost board is ideal for BASIC Stamp student homework, science fair projects, or the naturally curious student who wishes to carry their Stamp projects beyond the classroom. The HomeWork Board has another feature educators have requested: 220 ohm resistors across all BASIC Stamp I/O lines. These resistors provide additional protection against mis-wiring.



BASIC Stamp Activity Kit - #90005; $99.99 - This economical starter kit features the HomeWork Board project platform with a surface mount BASIC Stamp 2 microcontroller along with the 350-page *What's a Microcontroller?* text. USB to Serial Adapter and USB A to Mini-B cable included. Also included is a components pack to support you in building over 40 projects! Parallax also provides complete technical support for the BASIC Stamp Activity Kit. For more information on this great way to get started, visit www.parallax.com/go/WAM.

BASIC Stamp 1 Carrier Board - #27110; $4.99 - Provides a wire-wrap or solder area for permanent BASIC Stamp 1 projects, a 9 V battery clip, and programming 3-pin connection. BS1-IC not included. Programming requires the BASIC Stamp 1 Serial Adapter (sold separately). Dimensions: 1.5 x 2 in (3.8 x 5.1 cm)

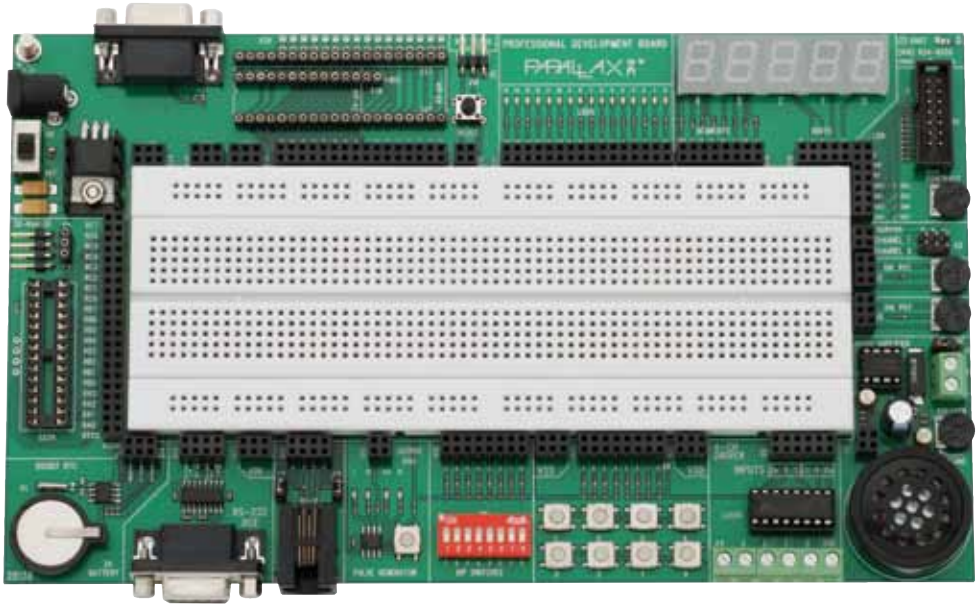
BASIC Stamp 1 Serial Adapter - #27111; $4.99 - Designed to program the BASIC Stamp 1 via a PC's serial port using the Windows-based BASIC Stamp Editor. One end plugs into a serial cable and the other onto a 3-pin header provided on BASIC Stamp 1 development boards. Dimensions: 1.65 x 0.7 in (41.9 x 17.8 mm)

BASIC Stamp 1 Project Board - #27112; $29.99 - Consists of a surface-mounted BASIC Stamp 1 on a 3.25 x 2.5 in (8.3 x 6.4 cm) printed circuit board. Includes 9 V battery clip, mechanically interlocked 2.1 mm power jack, DB-9 connector for programming (no adapter needed), and LM2936 regulator providing 40 mA for your projects.

BASIC Stamp 1 module (#BS1-IC; pg 12)

BASIC Stamp 2 Carrier Board - #27120; $14.99 - Supports all 24-pin BASIC Stamp modules. Features a serial (DB9) programming connection, generous through-hole prototyping area, reset button, and 9 V battery clip (battery not included). Perfect for dedicated BASIC Stamp projects soldered to the through-hole area. Dimensions: 2.57 x 3.10 x 0.56 in (6.5 x 7.9 x 14.5 cm)

Super Carrier Board - #27130; $19.99 - Versatile through-hole development board for a BASIC Stamp 1 (BS1-IC) and 24-pin BASIC Stamp 2 series modules. Used for experiments and permanent BASIC Stamp projects soldered to the through-hole area. Dimensions: 4 x 3 x 0.65 in (10.2 x 7.62 x 1.65 cm). Solder-hole area dimensions: 1.5 x 2 in (3.81 x 5.08 cm)



Professional Development Board - #28138; $159.99 - Our Professional Development Board (PDB) is high-quality, fully-integrated development platform for BASIC Stamp microcontrollers. A wide variety of typical I/O (LEDs, LCD interface, buttons, etc.) devices and circuitry are built into the PDB, providing the developer with an ideal platform for rapid microcontroller project development.

- Power Requirements: 6-12 VDC (1 A Power Supply Recommended, 65 mA quiescent current)
- Programming Interface: RS-232 DB-9 Female Connector (#28031 required for USB connection)
- Dimensions: 9 x 5.25 x 1 in (22.75 x 13.25 x 2.54 cm)
- Operating temp range: 32 to 158 °F (0 to 70 °C)

FEATURES:

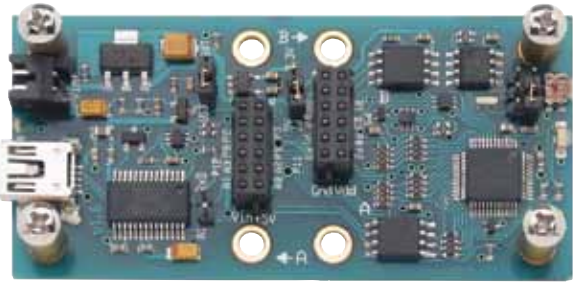
- Five blue 7-segment (plus decimal point) common-cathode LED displays
- Parallel LCD (available separately) may be configured in 4-bit or 8-bit mode
- Two servo-compatible headers
- Two 10 k Ohm potentiometers
- Audio amplifier with built-in speaker; with switch for external speaker
- L293D high-current driver for motors, solenoids, etc.
- Eight, normally-open pushbuttons (I/O lines protected, and pulled-up to Vdd via 10 K)
- Eight DIP switches (I/O lines protected, and pulled-up to Vdd via 10 K)
- Pulse generator with selectable frequency (1 Hz, 10 Hz, 100 Hz, or 1 kHz)
- RJ-11 connector; configurable for X-10 and 1-Wire communications
- RS-232 port with MAX232E transceiver
- DS1307 (I^2C) real-time-clock with 3 V back-up battery (pre-installed)

StampWorks Experiment Kit - #27297; $289.99 - The StampWorks manual includes 35 experiments based on the BASIC Stamp 2 microcontroller and the Professional Development Board. StampWorks gives you the hardware, the electrical components and, most importantly, the know-how to become a confident embedded programmer. As you work through the experiments you will learn about efficient embedded design, connecting circuits and "smart" sensors to the BASIC Stamp, adding computer control to your projects, and "Power PBASIC" programming techniques. This kit is recommended for those with previous microcontroller experience. If you are new to programming, start with the BASIC Stamp Discovery Kit (page 30; #27207) or the Boe-Bot Robot Kit (page 44; #28132).

With this kit you will learn how to:

- Flash LEDs
- Control 7-segment and parallel LCD display
- Sense push buttons and switches
- Create a light controlled Theremin
- Control servo and stepper motors
- Measure temperature and voltage

StampWorks Manual (alone) - #27220; $24.99



BS2pe Motherboard (MOBO) - #28300; $49.99 - A compact, professional-grade platform for BASIC Stamp applications. With the MOBO and an assortment of plug-in daughterboards, users can easily develop systems requiring more processing power than a BS2pe alone can provide. The MOBO includes a USB interface for programming and debugging on an attached PC. Two available daughterboard sockets. Dimensions: 2.75 x 1.35 in (69.9 x 34.3 mm)

FEATURES:

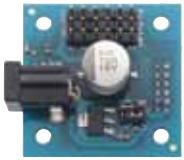
- Onboard power select jumpers: USB or external (6 to 9 VDC) power supply
- 3.3 and 5 VDC, jumper selectable
- Power consumption as low as 18 mA
- User-programmable multi-color status LED

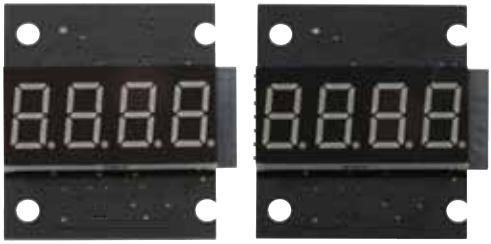
BS2pe Prototyping Daughterboard - #28310; $1.99 - A convenient through-hole board that allows you to build your own circuits with the MOBO motherboard. Has 70 uncommitted plated through-holes on a 0.1 inch grid for your components and 14 grounded through-holes.

TCS230-DB Color Sensor - #28302; $59.99 - The TCS230-DB is a complete color detector that can detect and measure a nearly limitless range of visible colors. Applications include test strip reading, sorting by color, ambient light sensing and calibration, and color matching.

TSL1401 Linescan Imaging Sensor Daughterboard - #28317; $49.99 - Provides one-dimensional sight to almost any microcontroller. Includes the TAOS TSL1401R 128-pixel sensor chip, a 7.9 mm focal length imaging lens, and control electronics to aid in capturing images for evaluation. It produces a clocked analog data output, whose voltage levels correspond to the light intensity at each pixel.

Power Input, 3-pin Header I/O DB - #28301; $14.99 - Plugs into the MOBO to provide both power and a handy interface to potentiometers and servos, along with Parallax's various three-pin devices.





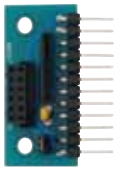
7Seg-DB Display - $19.99

- **Master Unit #28312**
- **Slave Unit #28313**

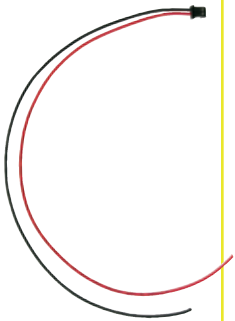
Each module provides four digits of LED display, including alphabetic and punctuation capability. The master module plugs directly into a motherboard. With the master module installed, up to seven additional slave modules can be added, daisy-chain-style, for a total of 32 contiguously-displayed digits.

All daughterboards are directly compatible with the MOBO. If you would prefer to use a solderless breadboard (like the Board of Education, page 31) we strongly recommend the DB-Expander DB-to-SIP below.

DB-Expander DB-to-SIP - #28325; $9.99 - Provides the means to use daughterboards with solder-less breadboards like the Board of Education and Professional Development Board.



MOBO Power Cable - #800-28300; $3.20 - Connect external power to the MOBO without the need for the Power Input, 3-pin Header I/O DB. Just connect the mating connector to the External Power connector on the Motherboard and supply 6-9 VDC.



Daughterboard Extension Cable - #800-28301; $5.99 - Provides a convenient connection between the MOBO and plug-in daughterboards. Cable is 7.5 inches in length (19.05 cm).

Example project shown with enclosure and 7-Segment display.

MOBO Customizable Enclosure Kit - #28303; $19.99 - Convenient and attractive way to house devices built up from the MOBO and the various daughterboards that plug into them.

BASIC Stamp Education

Parallax has been in the technology literacy business since 1997. What began with our acclaimed *What's a Microcontroller?* text has expanded to include books on robotics, industrial control, sensors, and many other electronics subjects, along with a high level of educator support. Our Stamps in Class hardware and tutorials are great resources for STEM programs!

Stamps in Class "Mini Projects" - To supplement our texts, Parallax provides a bank of projects for the classroom. Designed to engage students, each "Mini Project" contains full source code, "How it Works" explanations, schematics, and wiring diagrams for a device a student might like to use. Many projects feature an introductory video, to promote self-study in those students most interested in electronics and programming. Just follow "Stamps in Class 'Mini Projects'" link at www.parallax.com/Education.

Educators Courses - These courses for instructors are taught by Parallax engineers or experienced teachers who are using Parallax educational materials in their classrooms. To learn more, visit www.parallax.com/Education and click on "Educator's Course Information."

Parallax Educator's Forum - In this free, private forum, educators can ask questions and share their experiences with using Parallax products in their classrooms. Supplemental Educational Materials are also posted here. To enroll, e-mail education@parallax.com; proof of status as an educator will be required.

Supplemental Educational Materials - Select Parallax educational texts have an unpublished set of questions and solutions posted in our Parallax Educator's Forum; we invite educators to copy and modify this material at will for the quick preparation of homework, quizzes, and tests. You may also find Power Point (*.PPT) presentations and test materials prepared by other educators posted online.

Copyright Permissions for Educational Use - Our Stamps in Class texts, *BASIC Stamp Manual*, *Propeller Manual*, and *Propeller Education Labs* are all available as free PDF downloads, and may be duplicated as long as it is for educational use exclusively with Parallax products and the student is charged no more than the cost of duplication. **No site license is required for the download, duplication and installation of Parallax software for educational use on as many school or student computers as needed.**

BASIC STAMP EDUCATION FLOWCHART

You can pick many paths through Stamps in Class texts. Simply choose an introductory tutorial and make your next move toward whichever subject track will be most applicable for you or your students.

BOE = Board of Education
HWB = HomeWork Board

INTRODUCTORY

What's a Microcontroller?

Difficulty (out of 10): 3
Hours to complete: 40
BOE, HWB

Robotics with the Boe-Bot

Difficulty (out of 10): 5
Hours to complete: 60
BOE, HWB, or
Boe-Bot Robot Kit

Full-text downloads available online FREE!

Applied Sensors

Difficulty (out of 10): 7
Hours to complete: 60
BOE

Smart Sensors & Applications

Difficulty (out of 10): 8
Hours to complete: 60
BOE, HWB

Process Control

Difficulty (out of 10): 8
Hours to complete: 60
BOE

SENSORS

Understanding Signals

Difficulty (out of 10): 3
Hours to complete: 35
BOE, HWB

Basic Analog and Digital

Difficulty (out of 10): 6
Hours to complete: 60
BOE, HWB

SIGNALS

IR Remote for the Boe-Bot

Difficulty (out of 10): 7
Hours to complete: 17
Boe-Bot Robot Required

Applied Robotics with the SumoBot

Difficulty (out of 10): 8
Hours to complete: 30
SumoBot Competition Kit Required

ROBOTICS

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 and circuit interaction do not need to complete the introductory texts to use our higher level tutorials. Parallax's educational paths do not necessarily require a completion of the entire progression.

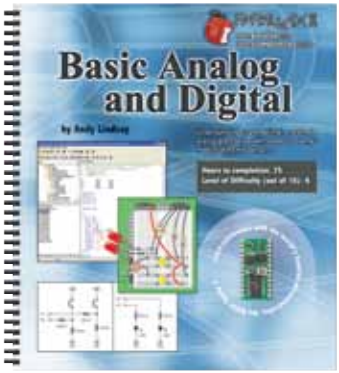
What's a Microcontroller? (WAM)

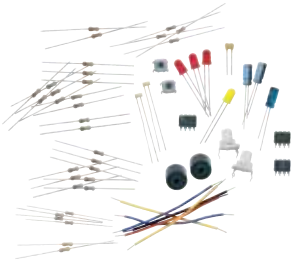
- **Text - #28123; $25.99**
- **Parts Kit - #28122; $45.99**
- **Parts & Text - #28152; $69.99**

This introductory microcontroller programming text introduces downloading PBASIC code to a BASIC Stamp module, building a circuit on a breadboard, and both simple and advanced circuits with LEDs, tact switch, pushbuttons, and a servo. It's a starting point for middle school, high-school and college level students (even a background reference for higher levels). The activities in this text are designed to introduce the student to many basic principles in the fields of computer programming, electricity and electronics, mathematics and physics. WAM employs 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. Visit www.parallax.com/go/WAM.

BASIC Analog and Digital (BAAD)

- **Text - #28129; $24.99**
- **Parts Kit - #28128; $29.99**
- **Parts & Text - #28155; $49.99**





Analog to digital (A/D) and digital to analog (D/A) conversion make it possible for a digital device, like the BS2, to both measure and control "real world" values such as voltage, light level, and frequency. The BAAD experiments introduce PBASIC commands for A/D conversion with resistor/capacitor circuits, interfacing an ADC0831 8-bit A/D converter, scaling analog outputs into meaningful digital values, analyzing time-varying signals, and using PWM as analog output. These concepts are conveyed using potentiometers, LEDs, speakers, photoresistors, and pushbuttons.

- Building a comparator
- Building a simple digital DC voltmeter
- Building a resistive ladder network for D/A conversion
- Recording and displaying frequency and light data
- D/A conversion with pulse width modulation

Smart Sensors & Applications
- **Text - #122-28029; $29.99**
- **Parts Kit - #130-28029; $129.99**
- **Parts & Text - #28029; $139.99**

Learn to interface a variety of sensors to a BASIC Stamp then display and interpret the data you collect.

Process Control
- **Text - #122-28176; $24.99**
- **Parts Kit - #130-28176; $29.99**
- **Parts & Text - #28176; $49.99**

Learn to control automated industrial processes with the BASIC Stamp and analyze your data with StampPlot software.

Applied Sensors
- **Text - #28127; $29.99**
- **Parts Kit - #28126; $49.99**
- **Parts & Text - #28153; $75.99**

An electronics text with an earth science theme. Emphasis on resistor/capacitor networks, serial communication, and data logging.

***Robotics with the Boe-Bot* (page 44-45)** - Learn basic robotics while you build and program our best selling educational robot, the Boe-Bot.

IR with the Boe-Bot Robot
- **Text - #70016; $24.99**
- **Parts Kit - #29122; $12.99**
- **Parts &Text - #28139; $34.99**

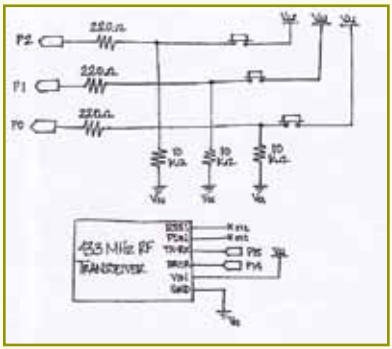
Add infrared communication and control to your Boe-Bot robot. You can directly control the Boe-Bot game-controller style, remotely set roaming speed and distance, combine remote control and autonomous roaming functions, and remotely select autonomous roaming modes.

- ***Applied Robotics with the SumoBot* Text - #27403; $29.99**
- **SumoBot Competiton Kit (page 48)**

Advanced robotics. Learn friction analysis, memory optimization, state-machine diagrams, and self-calibrating sensors to program a winning SumoBot.

NEW! *Understanding Signals with the PropScope*
- **Text - #122-32225; $39.99**
- **Parts & Text - #32225; $249.99**

Learn to make the most out of oscilloscope data with the BASIC Stamp and the PropScope USB oscilloscope. See page 77 for more details.



Filled with easy-to-follow hand drawn schematics.

NEW! *STAMPS IN CLASS: Mini-Projects* Text - #122-28100; See www.parallax.com

This collection of hands-on projects harvested from our Forums makes a perfect companion to *What's a Microcontroller?* or *Robotics with the Boe-Bot*. Some projects need only the components you'd already have in those kits, and others make use of additional sensors and RF devices from Parallax.

CHAPTERS INCLUDE:

- Breadboarding Basics & Wiring Circuits from Schematics
- A Wireless Musical Keyboard
- Boe-Bot Robot Navigation with Accelerometer Incline Sensing
- Ping)))Dar - A Radar Style Display
- Boe-Bot Line Following with Four QTI Sensors
- ...and 8 more!

Some projects provide web addresses to Jessica Uelmen's popular YouTube videos (www.youtube.com/ParallaxInc) that nicely introduce and support the material—great for both the classroom and the independent learner.

Black & white text; approx. 220 pages.
ISBN 9781928982579

STEM: Science, Technology, Engineering, and Mathematics

"Boe-Bots are an integral part of our College Tech Prep Engineering Robotic and Digital Electronics curriculum, and are a great value for their cost. Our students use the robotics projects to learn about analog electronics using electronic components to create whisker guided, shadow following and infrared-guided robotic projects. The PBASIC programming language is easy to use and Parallax has great forums and books that help guide students and teachers through the Boe-Bot curriculum. We have had students win the National Robotics Challenge Maze and Sumo contests using the Boe-Bot Robot and the BASIC Stamp kits."

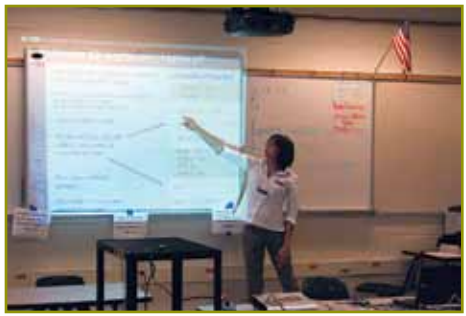
- Ritch Ramey
  Engineering Technology Instructor
  Tri-Rivers Career Center, Marion, Ohio

A hot topic of many political platforms and debates currently highlight the need for the United States to produce more graduates in the fields of science, technology, engineering and mathematics (STEM).

For years, the Stamps in Class Program has helped meet this need in classrooms around the world by augmenting STEM programs at the middle school, high school and university level. Parallax offers various kits and texts that can be tailored to a wide range of classroom applications. See the Stamps in Class Program Overview beginning on page 39.

The heart of the Stamps in Class program lies in providing engaging, hands-on activities to build student's interest in STEM topics. Teacher resources through our private Parallax Educator's Forum and two-day BASIC Stamp Educator's Courses (more information on page 38) provide a support system for new teachers planning to use Parallax products for their STEM classroom.

Visit www.parallax.com/go/STEM for more information.



BOE-BOT ROBOT

Boe-Bot Robot Kit - $159.99
- **Serial Version (w/USB Adapter & Cable) #28132**
- **USB Version #28832**

The ever-popular Boe-Bot Robot Kit (www.parallax.com/go/Boe-Bot) is our most complete reprogrammable robot kit and is a great resource for STEM programs!

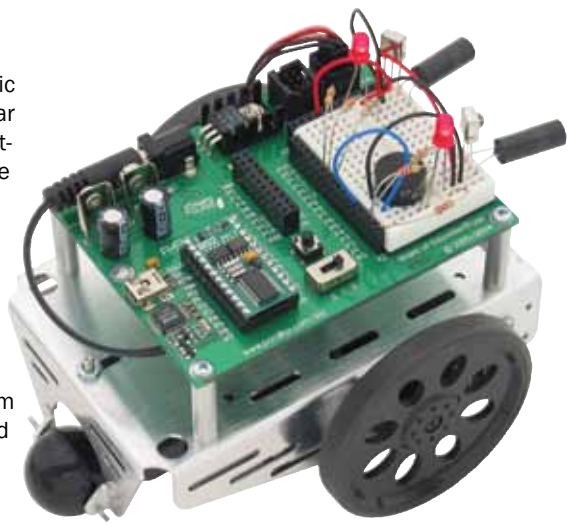
Audience: Educational, Robot Enthusiasts. Suitable for ages 14 and up, it is used in hobbyist's homes as well as in middle and high schools, vocational schools, colleges and universities in pre-engineering and robotics courses. **No previous robotics, electronics or programming experience is necessary.**

The Boe-Bot robot is built on a brushed aluminum chassis that provides a sturdy platform for the continuous rotation servo motors and BASIC Stamp module's Board of Education carrier board. Mounting holes and slots may be used to add custom robotic equipment or off-the-shelf add-ons. The rear wheel is a slider ball held in place with a cotter pin. Drive wheels are molded to fit on the servo spline and held in place with a screw.

What really makes the Boe-Bot unique is the BASIC Stamp microcontroller's flexibility of programming when coupled with breadboard circuit construction. Following along in *Robotics with the Boe-Bot*, users quickly learn about embedded projects, from wiring and components to programming and mechanical dependencies.

The Boe-Bot robot's flexibility stems from the fact that it's a rolling Board of Education carrier board. All I/O projects are built on the breadboard. The Board of Education programming board (and BS2-IC) may be removed to be used as your platform for other projects in the Stamps in Class series. The robot may be programmed to follow a line, follow light, or roam autonomously while avoiding objects by completing the activities in the *Robotics with the Boe-Bot* text.

We're particularly proud of Andy Lindsay's *Robotics with the Boe-Bot* text. The Robotics text includes 41 activities for the Boe-Bot robot with structured PBASIC 2.5 source code support and bonus challenges with solutions in each chapter. Starting with basic movement and proceeding to sensor-based projects, customers quickly learn how the Boe-Bot is expandable for many different robotic projects.



KIT CONTENTS:

- Board of Education programming board
- BASIC Stamp 2 module
- Programming cable
- A set of passive components (wires, resistors, capacitors)
- Sensors (contact, infrared, & visible light)
- Hardware (chassis, motors, wheels, etc.) to assemble the robot's body

- **Power:** 4 AA batteries (not included)
- **Assembly Tools:** A small Phillips/flathead screwdriver is included, and 1/4" wrench and angle cutters are not included but would be useful.
- **Time Required to Build and Program:** 2 to 3 hours - Boe-Bot robot uses the pre-built Board of Education carrier board to save time.
- **I/O Components:** LEDs, speaker, push button, photoresistors, resistors and capacitors, infrared LEDs and receivers, whisker contact switches.

Parallax offers the most complete, clear and interesting support for this kit. Over 90,000 Boe-Bot robots are in use by hobbyists, educators and students around the world, which provided lots of feedback for improvements to this popular kit along the way.

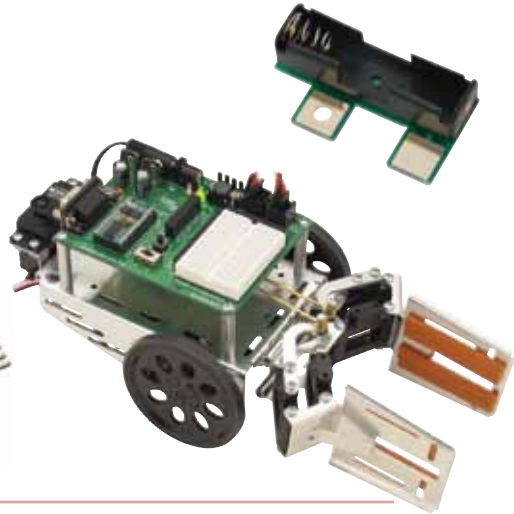
Once you've mastered the basics, you can keep experimenting and expanding your Boe-Bot robot's capabilities. Check out our robot accessories, sensors, and our other Stamps in Class texts such as *IR Remote for the Boe-Bot*.

If you already own a BASIC Stamp 2 module and a Board of Education (or a HomeWork Board), you can purchase just the Boe-Bot parts and text kit to get started with robotics.

Robotics with the Boe-Bot

- **Text only - #28125; $20.99**
- **Parts Kit only - #28124; $81.99**
- **Parts & Text - #28154; $89.99**

Boe-Bot Refresher Pack - #572-28132; $9.99 - The Refresher Pack is the same bag of electronic parts that ships with Boe-Bot Robot kits. Every sensor, wire, capacitor, resistor, LED, photoresistor and piezo-speaker for each book activity is included in this pack. *We also stock individual components to help you maintain your fleet.*



Boe-Bot Tank Tread Kit - #28106; $34.99 - Turn your Boe-Bot robot into a tank with this add-on kit. Simply remove the wheels from your Boe-Bot robot and attach the gears and tread to give your Boe-Bot robot the ability to traverse unfriendly terrain.

Boe-Bot CMUcam - #30051; $139.99 - Track images with the CMUcam! Designed specifically for the Boe-Bot robot; allowing it to find and track colors at 17 frames per second. The CMUcam also has the ability to control one servo or have one digital I/O pin in its advanced function.

Say It Module - #30080; $79.99 - Add voice recognition functionality for 23 built-in pre-programmed or up to 32 user-defined commands. The Say It GUI software for the BASIC Stamp 2 provides an interface for training the module and producing template code. Or, use the robust serial protocol to access the Say It module functions from other microcontrollers.

Boe-Boost - #30078; $4.99 - Increase the battery capacity of the Boe-Bot from four to five AA cells. This results in a 7.5 V nominal output voltage for alkaline cells, making it possible to discharge them more fully before replacement. It also yields a 6 V nominal output voltage from nickel-cadmium (NiCad) and nickel-metal-hydride (NiMH) rechargeable batteries, permitting their use with the Boe-Bot.

Boe-Bot Gripper Kit - #28202; $54.99 - Teach your Boe-Bot robot to play fetch by adding pick-up and carry capability. Features parallel plates that open, clamp onto and lift objects all with one cleverly utilized Parallax Standard Servo. Since the Gripper's servo plugs right into a servo port on the Board of Education, no additional battery pack is needed. The lightweight but sturdy aluminum, brass and plastic Gripper hardware weighs less than 7 ounces.

Boe-Bot Crawler Kit - #30055; $24.99 - Turn your Boe-Bot robot into a Crawler by adding this accessory kit. Includes printed documentation with detailed assembly instructions. The Crawler runs on standard Boe-Bot source code with only minor adjustments for ground speed. Sample PBASIC code is included in the documentation. The Boe-Bot robot (and chassis) are not included.

Digital Encoder Kit - #28107; $39.99 - This kit answers a customer request for wheel position feedback used to improve dead-reckoning, solve mazes, contests, and map paths of travel. The infrared reflective sensors mount next to the Boe-Bot robot's wheel to count cycles using the wheel holes. Easy installation & programming.

Boe-Bot robot not included with any of the accessory kits on these pages.

QTI Line Follower AppKit for the Boe-Bot - #28108; $29.99 - This kit uses QTI infrared emitter/receiver modules to easily enhance the line-following capability of your Boe-Bot robot. Mount three or four sensors underneath the Boe-Bot chassis, and adjust the position to detect lines of different widths. Learning to use the QTI is easy with the illustrated instructions and example BASIC Stamp code provided.

PING))) Mounting Bracket Kit - #570-28015; $19.99 - Equip your Boe-Bot (or any robot) to make a 180° sweep of its environment to locate and determine the location and distance to obstacles with the PING))) Ultrasonic Distance Sensor. Great for autonomous navigation, or to hone in on a specific object. Includes a Parallax Standard Servo, aluminum brackets and complete mounting hardware. PING))) Ultrasonic Distance Sensor sold separately, see page 86.

SumoBot Robot Competition Kit (Serial w/USB Adapter & Cable) - #27402; $239.99 - Build and program two SumoBot robots designed to wrestle in the mini-sumo competition ring! The electronics consists of a surface-mounted BS2 module and infrared sensors to detect your opponent and the edge of the Sumo Ring. Additional components include piezospeakers, resistors, pushbuttons and LEDs to build custom breadboard circuits.

This kit comes with two printed texts. The *SumoBot Manual* has assembly instructions and test programs. When your bots are up and running, expand your skills by following the activities in *Applied Robotics with the SumoBot* - an advanced text in our Stamps in Class series. Activities include friction analysis, self-calibrating sensors, memory optimization with multipurpose variables and a sensor flags register, and state-machine diagrams for sensor-based navigation. You will also learn EEPROM data logging lets you record your robot's sensor and program states during a match to help you troubleshoot and analyze the performance of your program strategies.

KIT CONTENTS:

- Two SumoBot robots to assemble, with a development board with surface-mounted BASIC Stamp 2 and black anodized aluminum chassis
- Infrared sensors, LEDs, piezospeakers, resistors, and pushbuttons
- *SumoBot Manual*
- *Applied Robotics with the SumoBot*
- Parallax USB to Serial Adapter and Cables
- 36 x 36 inch SumoBot Robot Competition Ring poster
- Screwdriver

8 AA batteries not included.

Additional purchasing options:

***Applied Robotics with the SumoBot* Text (alone) - #27403; $29.99**

***SumoBot Manual* (alone) - #122-27400; $24.99**

36 x 36" SumoBot Competition Ring (alone) - #27404; $8.99

SumoBot Robot Kit - #27400; $159.99 - Includes electronics, hardware and components for single robot, serial programming cable, and *SumoBot Manual*.

Parallax Online Resources

Parallax is known for our customer service, friendly microcontrollers, and legendary resources. Our social media will keep you current with the latest Parallax has to offer. Use our free documentation, tech support, educational materials, and forums to get your project on its way. Whatever your project style, we have a level of support to meet your needs.

Facebook and Twitter - Two ways to get the latest from Parallax. Get Parallax news updates, Daily Deal notifications, learn about new products, and receive links to the projects and objects of the week by following Parallax on Twitter or becoming a friend of Parallax on Facebook. We also offer an RSS feed of this information, subscribe from the link on the Parallax home page.

- http://www.twitter.com/ParallaxInc
- http://www.facebook.com/ParallaxInc

YouTube - For official video content, including tutorials and product demonstrations, visit http://www.youtube.com/ParallaxInc.

Online Discussion Forums - Visit http://forums.parallax.com to get involved in the fun. Browse threads anonymously or sign up and join in. The Forums are a great place to get questions answered by Parallax staff and other knowledgeable users, share projects, and find inspiration. We have discussion forums for: Propeller Chip, BASIC Stamp, Sensors, Stamps In Class, Robotics, Wireless, etc.

Propeller Object Exchange - The Propeller Object Exchange (http://obex.parallax.com) contains many source code object files submitted by customers and Parallax engineers free for use under the MIT license. Objects available for data storage, displays, motor control, communication protocols, human input devices, sensors, math functions, and other categories.

You can find all of our free downloads. at our main site (http://www.parallax.com).

S2

S2 (Scribbler 2) Robot - #28136; $99.99 - The S2 robot is a complete redesign of the popular Scribbler, based on the Propeller chip! On the surface it looks like we've merely turned a blue robot red, but there's so much more:

- Propeller P8X32A-Q44 support for true robotic multi-core processing, which now enables a variety of robot tasks, sensors and drive routines to be compartmentalized into tidy code objects and processor COGs
- Backward-compatibility with the existing Scribbler GUI
- Wide-access "hacker port" with many I/Os and a substantial power supply
- Compatibility with existing third-party hardware designs, such as the Georgia Tech IPRE Fluke
- Improvements to drive system with wheel encoder feedback, stronger motors and a straight-steering robot

But there's so much more as you'll see down below. The Propeller has enabled us to provide a highly capable platform that brings forward many new capabilities. Consider parallel processing, speech synthesis and the expanded hacker port, not to mention the variety of languages (Spin, ASM, C, PropBASIC) and programming environments (Windows, Mac, Linux) now available for the Propeller!

And this robot is entirely open-sourced! You can make your own should you desire, and sell them to anybody you wish!

FEATURES:

- P8X32A-Q44 Processor
- Powerful motors: accessible encoder feed back (480 counts/rev) and higher speed
- Bi-color LEDs
- Red enclosure
- Improved stall sensor on rear wheel
- Hacker port includes (8) eight I/Os and 1 A power supply
- Louder speaker speech synthesis
- Microphone input for speech or sound recognition
- Improved line following sensors with analog output
- Code-compatible GUI or Propeller IDE programming interface

BATTERY
Six AA batteries required
Battery supply: 6.00 - 9.60 VDC

DIGITAL LOGIC
Supply voltage: 3.17 - 3.43 VDC
Supply current: 150 mA

HACKER PORT
Supply Voltage: 4.80 - 5.17 VDC
Supply Current: 1,500 mA

MOTOR
Torque: 10 - 35 g-cm
Current: 180 - 470 mA
Voltage: 3 to 12 VDC
Kt (torque constant): 0.074 g-cm/mA

MICROPHONE ANALOG INPUT
Frequency response (-3dB): 100 - 3,000 Hz

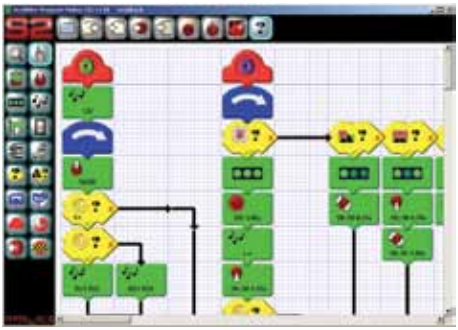
LIGHT SENSOR ANALOG INPUT
Sensitivity (0-200 Lux): 8 mV/lux
Frequency response (-3dB): 700 Hz

MOTOR CURRENT ANALOG INPUT
Sensitivity (0-500 mA): 5 mV/mA

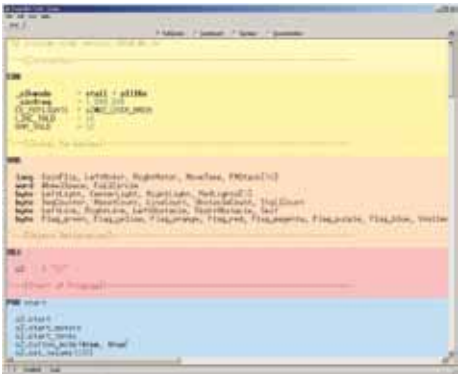
SPEAKER OUTPUT
Frequency Response (-25 dB):
700 – 10,000 Hz

WHEEL ENCODERS
Counts per wheel revolution: 480 cnts/rev
Linear distance per count: 0.520 mm/cnt

Inside the fully hackable S2.

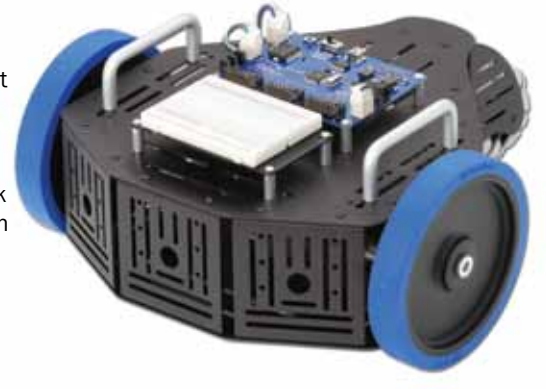


Program the S2 with the easy GUI software...



...or program in the Propeller Spin language!

Stingray Robot Kit - #28980; $249.99 - This highly versatile mobile robot platform sports a low-profile design and a convenient form factor that is perfect for a variety of mid-sized robotic projects. The chassis is constructed from 0.625 inch thick (1.58 mm) 5052 aluminum sheet metal with a lightly grained black anodized finish for increased durability and scratch-resistance.



Robust 7.2 VDC motors with all-metal-gear construction use machined aluminum hubs to positively engage the 4.875 inch (12.4 cm) diameter wheels. The result is a solid robot chassis that moves with smoothness and agility. The motor's speed is 310 RPM at 7.2 V which is approximately 6.6 feet/sec (2.0 m/s).

Each chassis panel has a variety of mounting holes and slots to accommodate a wide range of accessories. A mounted breadboard provides prototyping space, room for additional breadboards and circuit boards if desired. The Stingray's control electronics are integrated onto the included Propeller Robot Control Board.

ADDITIONAL FEATURES:

- High-quality, scratch-resistant, type-2 anodized aluminum alloy chassis
- Solid 4.875 in (12.4 cm) diameter wheels with durable high-traction rubber tread
- Innovative multi-directional tail wheel
- Propeller Robot Control Board included
- Breadboard provided for prototyping space

6 AA rechargeable 1.2 V batteries (not included).

Propeller Robot Control Board (alone) - #28230; $99.99 - Propeller I/O pins P0-P23 are buffered through 8-bit bidirectional voltage level-shifters to provide compatibility with 0 to 5 V digital signals common to many devices. If desired, these level-shifters can be disabled, and each of the Propeller's 24 general purpose I/O pins can be directly connected using the available through-hole solder pads.

FEATURES:

- On-board Propeller microcontroller
- Mini-B USB connector
- Wide input supply range: 6.5 to 20 VDC
- Switching regulators provide 3.3 and 5.0 VDC at up to 3 A each
- Dual H-bridges for DC motor control; up to 2.8 Amps per channel
- "Servo-style" headers provide a power and ground connection for each of 24 general purpose I/O pins

Propeller QuadRover Robot - #28195; $4,999.00 - This gas-powered robot is built using a Honda 2.5 HP 4-stroke engine and hydraulic power system. It is controlled by a Propeller chip enabling endless programming possibilities. A 64 KB EEPROM leaves 32 KB for non-volatile data storage, and ample expansion ports provide plenty of flexibility for added sensors.

Four solenoid valves allow for the hydraulic power to be independently enabled, disabled, or reversed for either side of its skid steer system. The robot can rotate in position by making a complete hydrostatic turn or by braking one side and making an arc-turn, which can be accomplished at low or high speed. Straight-away top speed is up to 12 miles per hour. Servo controlled throttle and disk brakes make for precise acceleration and deceleration.

The Propeller QuadRover robot ships fully assembled and ready to program. The electronics include a Propeller-powered control board with connections for GPS, compass, and 3-axis accelerometer sensors. A remote is also included. Prior to operation the user needs to add the hydraulic oil and gasoline, load the Propeller program and perform bench top testing. This process requires up to a full day.

FEATURES:
- Red and clear anodized; Black powder coated
- Dual grab handles at each end for easy handling
- Dual ventilated disc brakes (rear)
- All terrain 4.10/3.50-4 Kenda tires
- Easy access re-fueling location
- Electronics perch and mounts

DIMENSIONS:
- Total: 29 x 19 x 21 in. (73 x 48 x 53 cm)
- Wheelbase: 16.0 in. (40 cm)
- Ground Clearance: 3 in.(7.62 cm) front - 2 in. (5 cm) rear (disc brake)

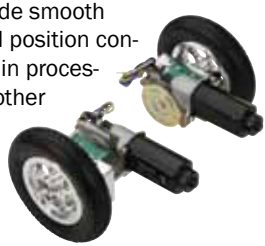
Robot weighs 89 lbs. (shipping weight 135 lbs.).
Contact sales@parallax.com for a shipping estimate.

The aluminum parts in these kits are machined at Parallax headquarters in Rocklin, CA.

Motor Mount & Wheel Kit with Position Controller - #27971; $259.99

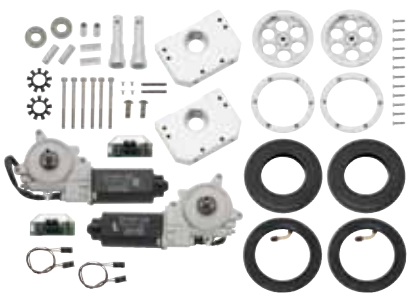
- Powerful 12 VDC motors are combined with precisely machined aluminum hardware to provide the power, strength, and beauty demanded by your mid-sized robot. The mounting block makes securing this kit a breeze; and the included 6 in. (15.3 cm) pneumatic rubber tires are durable enough to handle smooth or rugged terrain without hesitation.

Included Position Controllers use a quadrature encoder system to track the position and speed of each wheel and report the data on demand. They may be interfaced with HB-25 Motor Controllers (page 57) to automatically provide smooth speed ramping and position control; leaving the main processor free to handle other tasks like processing sensors, and maneuvering complex environments.



FEATURES:

- 5 V supply required for Position Controllers
- 36 encoder positions per revolution; approximately 0.5 inch resolution
- Single I/O line can control up to 4 Position Controllers



Caster Wheel Kit - #28971; $59.99

- Precision machined 6061 aluminum parts with high-quality ball bearings and pneumatic rubber tires. Dual independent tire design reduces vibration and drag, while increasing load-carrying capacity. Shielded ball bearings ensure a long maintenance-free life. Durable 3 inch sealed pneumatic tires are low-bounce and provide a smooth ride, even on rough surfaces. The top surface of the wheel's mounting plate and the motor blocks in our Motor Mount Kits are the same height, simplifying your chassis design.

7.2 V Motor, Bracket and Wheel Kit - #570-00070; $79.99

- Machined aluminum brackets, 7.2 V motors (with all-metal gears) and 4.875 in (12.4 cm) diameter durable-tread wheels mount easily to your custom robotic platform.

FEATURES:

- Machined 6063 aluminum brackets anodized black for scratch resistance
- Four mounting holes for #8 screws
- Suggested motor controllers: HB-25 or Pololu, see page 54-55

NEW! Robot Base Kit - #28975; $29.99 - A plywood platform kit for the 12 V Motor Mount and Wheel Kit and the Caster Wheel Kit. Build a nearly complete robot, then add on your choice of processor and sensors (sold separately).

FEATURES:

- 18 inch diameter round robot base provides zero-turn radius
- Pre-drilled mounting locations for two motor bearing blocks & two caster wheels
- Pre-drilled mounting locations for up to 10 PING))) Ultrasonic Sensors and Protector Stands
- Under-carriage battery pack mount location for 12 V 7Ah batteries

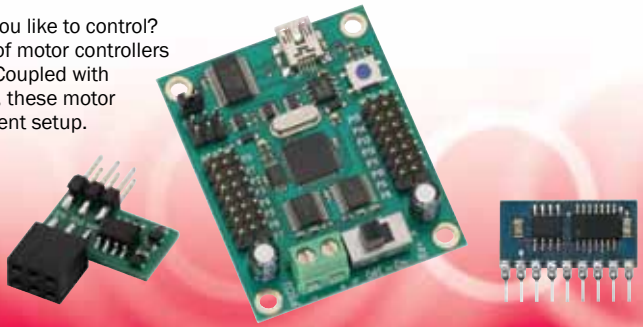
NEW! Robot Base Full Kit - #28970; $650.99 - This kit supplies nearly everything you would need to build a multi-directional robot, with enough PING))) modules to cover 360° of object detection. All you need to supply is power, a brain of your choice, and programming to get it around. The Robot Base Full Kit is offered with a combined savings of $162!

FULL KIT CONTENTS:

- (1) Motor Wheel Kit with Position Controller (#27971)
- (10) PING))) Ultrasonic Sensors (#28015)
- (2) Caster Wheel Kit (#28971)
- (1) Robot Base Kit (#28975)
- (2) HB-25 Motor Controller (#29144)
- (10) PING))) Protector Stand (#725-28015)
- (10) Servo Extension Cables (#805-00002)

MOTOR CONTROLLERS

What kind of motor would you like to control? Parallax provides a variety of motor controllers for your latest application. Coupled with one of our microcontrollers, these motor controllers provide an efficient setup.



Product	ServoPAL	Propeller Servo Controller	Micro Dual Serial Motor Controller
Stock Code; Price	#28824; $14.99	#28830; $34.99	#30052; $19.99
Ease of Use*	●●●●●	●●●○○	●●●●○
Motor Type	Servos	Servos	DC Motors
# of Motors	2	16 (32 w/2 PSC units)	1 or 2
Volts & Amps	6.5 VDC; 300 mA	4 - 7.5 V; up to 6 A	1.8 - 9 V; 1 A Peak/Motor

**Ease of Use rating system:* *5 black dots (easiest to use) to 1 black dot (more difficult to use).*

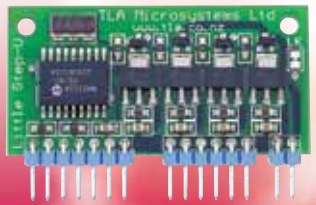
Parallax (Futaba) Servo - $12.99

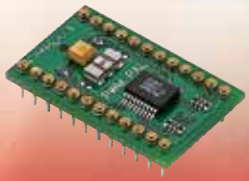
- Standard - #900-00005
- Continuous Rotation - #900-00008

Made exclusively by Futaba. Both servos may be controlled easily from a BASIC Stamp I/O pin using PBASIC's PULSOUT command. The Continuous Rotation Servo is especially well-suited to robotics applications and includes an adjustable potentiometer port to center the servo.

LCD/Servo Extension Cable

- 10 in - #805-00011; $2.25
- 14 in - #805-00012; $2.79





Little Step-U	HB-25 Motor Controller	PWMPAL
#27938; $69.99	#29144; $49.99	#28020; $29.99
●●○○○	●●●●○	●●○○○
Unipolar Stepper Motors	DC Motor	DC Motors/Servos
1	1 (or 2 turning in the same direction)	4
35 V; 3 A	6 -16 V; up to 25 A continuous	0.3 Hz; up to ~20 mA

4-Phase 12 Volt Unipolar Stepper Motor - #27964; $12.99 - Ideal for precision control, and may be easily operated in forward and reverse directions at varying speeds. This four-phase motor has a step angle of 7.5 degrees and requires 12 VDC for operation. This stepper motor is ideal for experimentation, proof of concept, and learning about stepper motor control.

KEY SPECIFICATIONS:

- Power Requirements: 12 VDC
- Comm.: 4-phase step, 7.5° per step
- Operating Temperature: 32 to 158 °F (0 to 70 °C)

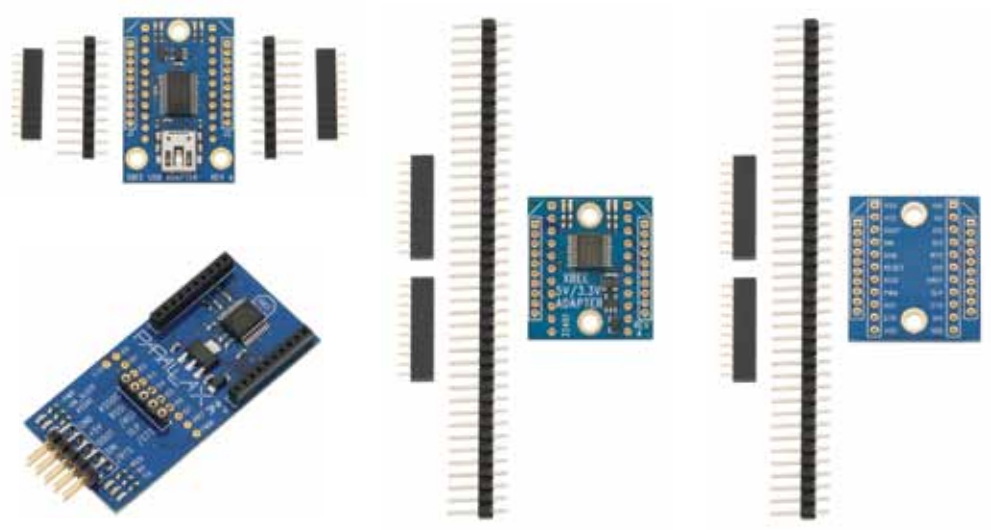
XBee

RF Modules

	XBee 1mW 802.15.4 Chip Antenna	XBee 1mW 802.15.4 Wire Antenna	XBee PRO 63mW 802.15.4 Chip Antenna
Stock #; Price	#32404; $19.00	#32405; $19.00	#32406; $32.00
Digi Part #	XB24-ACI-001	XB24-AWI-001	XBP24-ACI-001
Adapter Board Compatibility	*Compatible with all Parallax XBee Adapter Boards on page 58.*		
Interface Data Rate	Up to 115.2 Kbps		
Indoor Range	100 ft (30 m) (1)		300 ft (91 m) (1)
Outdoor Range	300 ft (91 m) (1)		1 mi (1.6 km) (1)
Receiver Sensitivity	-92 dBm		-100 dBm
Adjustable Power	Yes		No
Serial Data Interface	3.3 V CMOS UART (no configuration needed)		
Configuration Method	API or AT commands, local or over the air		
Frequency Band	2.4 GHz		
ADC Inputs	(7) 10-bit ADC Inputs		
Digital I/O	(8) General Purpose I/O		
Encryption	128-bit AES		
Channels	16 Direct Sequence		12 Direct Sequence
Supply Voltage	2.8 - 3.4 VDC (Absolute); 3.0 - 3.4 VDC (Recommended)		
Transmit Current	45 mA		215 mA
Receive Current	50 mA		55 mA
Power-down Current	< 10 µA		

(1) The wire antenna versions will provide 20-30% more distance than the chip antenna in the same environment.

XBee PRO 63mW 802.15.4 Wire Antenna	XBee Series 2 1.25 mW ZigBee Wire Antenna	XBee Series 2 PRO 63 mW ZigBee Wire Antenna
#32407; $32.00	#32409; $21.99	#32408; $32.99
XBP24-AWI-001	XB24-Z7WIT-004	XBP24-Z7WIT-004
Compatible with all Parallax XBee Adapter Boards on page 58.		
Up to 115.2 Kbps	1200 bps - 1 Mbps	
300 ft (91 m) (1)	133 ft (40 m) (1)	300 ft (91 m) (1)
1 mi (1.6 km) (1)	400 ft (120 m) (1)	2 mi (3.2 km) (1)
-100 dBm	-98 dBm	-102 dBm
No	Yes	
3.3 V CMOS UART (no configuration needed)		
API or AT commands, local or over the air		
2.4 GHz		
(7) 10-bit ADC Inputs	(4) 10-bit ADC Inputs	
(8) General Purpose I/O	(10) General Purpose I/O	
128-bit AES		
12 Direct Sequence	16 Direct Sequence	15 Direct Sequence
2.8 - 3.4 VDC (Absolute); 3.0 - 3.4 VDC (Recommended)	2.1 - 3.6 VDC	2.7 - 3.6 VDC
215 mA	35 mA	205 mA
55 mA	38 mA	47 mA
< 10 µA	< 1 µA	< 3.5 µA



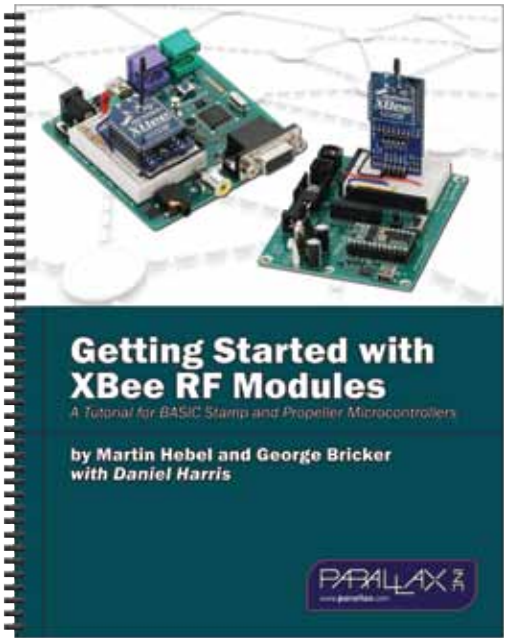
These adapter board provide an easy interface to the XBee/XBee Pro modules by converting the 2 mm pin spacing to breadboard friendly 0.1 inch spacing.

XBee USB Adapter Board Kit - #32400; $19.99 - This board comes in partially assembled kit form and provides a cost-effective solution to interfacing a PC or microcontroller to any XBee/XBee Pro module. The PC connection can be used to configure the XBee Module through Digi's X-CTU software. The board also provides an area to connect pluggable wires or solder connections and additional mounting holes.

XBee SIP Adapter - #32402; $24.99 - This fully-assembled, small-footprint solution for interfacing the most commonly-used XBee module features with your 3.3 or 5 V microcontroller. The 2 x 5 dual SIP header makes a sturdy connection to your breadboard or through-hole board, and brings the basic connections to your prototyping area without taking up a lot of space. The more advanced XBee features are still accessible, through additional headers on the module.

XBee 5V/3.3V Adapter Board Kit - #32401; $12.99 - This partially assembled board provides a cost-effective solution for interfacing your microcontroller to any XBee/XBee Pro module. A voltage regulator and 74LVC244A buffer is on-board for safe interfacing to a 5 V supply, allowing for easy compatibility with any Parallax microcontroller.

XBee Adapter Board Kit - #32403; $2.99 - This low cost XBee Adapter Board comes in a kit form and provides a cost-effective solution to interfacing to any XBee or XBee Pro module. By using this adapter board you can provide an easy interface to the XBee or XBee Pro modules by converting the 2 mm pin spacing to breadboard friendly 0.1 inch spacing. The adapter boards also provide a means to connect pluggable wires or solder connections and also provide mounting holes.



NEW! XBee Series 1 Starter Kit (includes text) - #32450; See www.parallax.com

NEW! *Getting Started with XBee RF Modules: A Tutorial for BASIC Stamp and Propeller Microcontrollers* (alone) - #122-32450; See www.parallax.com

XBee modules provide an incredibly versatile RF communication solution for microcontroller projects. Ready to use for bidirectional, point-to-point communication in their default state, they can also support complex networking with additional configuration via serial commands sent from your microcontroller, or through Digi's free X-CTU software.

This Starter Kit introduces basic and advanced setups with XBee Series 1 projects you can do on your desktop. Written by Martin Hebel and George Bricker of Southern Illinois University, the tutorial features both BASIC Stamp (PBASIC) and Propeller (Spin) code examples, allowing you to see similar code running in both of these Parallax microcontrollers. Subjects include XBee testing and configuration, network topologies and communication strategies, and using XBee Reset, Sleep, and API modes.

Chapters 1 through 6 can be completed with your own BASIC Stamp or Propeller development boards, and the material included in the kit:

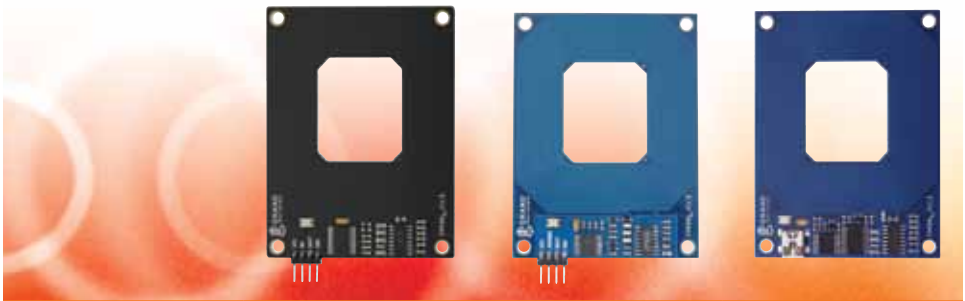
- Getting Started with XBee Modules text
- (3) Series 1 XBee 1 mW wire antenna modules
- (2) XBee SIP Adapter Boards
- (1) XBee USB Adapter Board
- (2) XBee Adapter Boards
- Standard Servo, pushbutton
- Capacitor and resistors

Chapter 7 includes advanced BASIC Stamp and Propeller projects that also require a Boe-Bot robot and additional sensors and accessories from Parallax, sold separately. Visit www.parallax.com/go/XBee to view the full PDF for details.

Note: Soldering is required for the XBee Adapter Board and XBee USB Adapter Board.

RFID Reader Modules

Designed in cooperation with Grand Idea Studio, our RIFD Reader Modules are convenient low-cost solutions to read EM 4100 low-frequency (125 kHz) passive RFID transponder tags. The RFID Reader Modules can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics, navigation, inventory tracking, payment systems, and car immobilization.

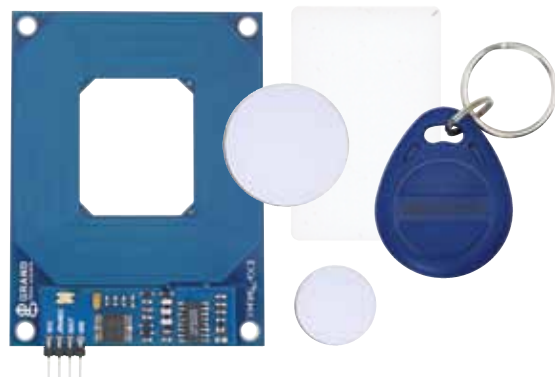


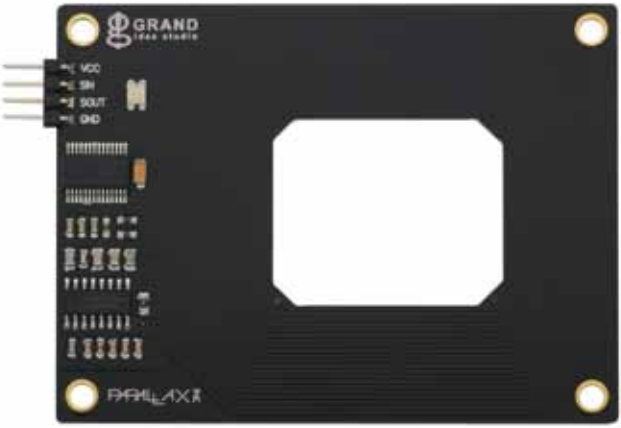
Name	NEW! RFID Read/Write Module (Serial)	RFID Reader Module (Serial)	RFID Reader Module (USB)
Stock #; Price	#28440; $42.99	#28140; $39.99	#28340; $39.99
Reads EM4100 Tags	●	●	●
Reads/Writes EM4x50 Tags	●		
Compatible w/most microcontrollers	●	●	
Compatible w/most personal computers			●

RFID Reader and Tag Sampler Kits

- **Serial Version - #32390; $42.99**
- **USB Version - #32395; $42.99**

Sampler includes RFID Card Reader Serial or USB Module and four RFID Transponder Tags: 54 x 85 mm Rectangle Card. 50 mm Round Tag, Blue Eye Key Fob Tag, 25 mm Disc Tag.





NEW! RFID Read/Write Module - #28440; $49.99 - Read and write passive RFID transponder tags up to 3 inches away. The RFID transponder tags provide a unique serial number and can store up to 116 bytes of user data, which can be password protected to allow only authorized access.

The RFID Read/Write Module can be used in a wide variety of hobbyist and commercial applications, including access control, user identification, robotics navigation, inventory tracking, payment systems, car immobilization, and manufacturing automation.

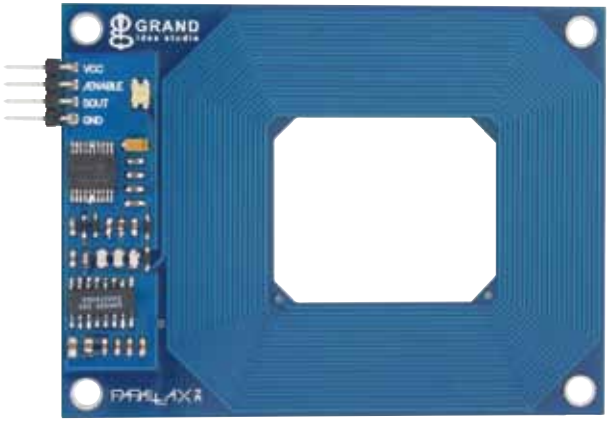
The Read/Write capability only works with the RFID R/W 54 x 85 mm Rectangle Tag (right). All other RFID tags sold by Parallax are Read compatible only.

FEATURES:

- Low-cost method for reading and writing passive, 125 kHz RFID transponder tags
- Up to 116 bytes of user data storage on a single tag
- Optional security features prevent tag from being read or written without password
- Bi-color LED for visual indication of status

RFID R/W 54 x 85 mm Rectangle Tag - #28441; $1.89 - This RFID Read/Write transponder tag is part of the EM Microelectronic-Marin SA EM4x50 family and is designed to work with our RFID Read/Write Module, Serial. Each tag contains a unique, read-only serial number (one of 2^32, or 4,294,967,296 possible combinations) and 116 bytes of user data area stored in a non-volatile EEPROM (Electrically Erasable Read Only Memory). The user data area can be optionally secured with a 32-bit password to allow only authorized read and write operations.

These tags are not compatible with the RFID Card Reader (USB or Serial).



RFID Reader (Serial) Module - #28140; $39.99 - The RFID Reader Module can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics, navigation, inventory tracking, payment systems, and car immobilization.

This 4-pin module is designed for easy prototyping and integration into stand-alone microcontroller-based applications. Parallax provides sample code in PBASIC on the RFID Reader product page. Dimensions are 3.25 x 2.45 in (8.25 x 6.22 cm).

FEATURES:

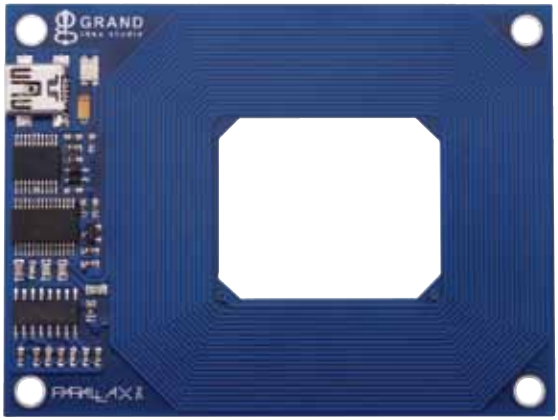
- Comes with two 54 x 85 mm Card Tags (#28141)
- Low-cost method for reading passive RFID EM4100 family transponder tags
- 2400 baud serial interface
- Enable input allows module to be enabled/disabled by software
- Bi-color LED for visual indication of status

RFID Reader (Serial) Module comes with two 54 x 85 mm Rectangle Card Tags.

RFID Transponder Tags - $0.99 each

- **25 mm Disk - #32397 (Range: ~5 cm)**
- **50 mm Round - #28142 (Range: ~6.8 cm)**
- **54 x 85 mm Card - #28141 (Range: ~6.3 cm)**
- **Blue Eye Key Fob - #28161 (Range: ~5 cm)**

There are a variety of transponder tags that come in different packages. Each tag has a specific range that is within 10% of the given distance for each type of tag. The reason for the 10% is due to environmental conditions and RFID modules.



RFID Reader (USB) Module - #28340; $39.99 - This module connects directly to a USB port both for power and to output transponder tag data to your custom PC application. A sample Visual Basic (VB.net) application is provided on the 28340 product page. Dimensions: 3.25 x 2.45 in (8.25 x 6.22 cm)

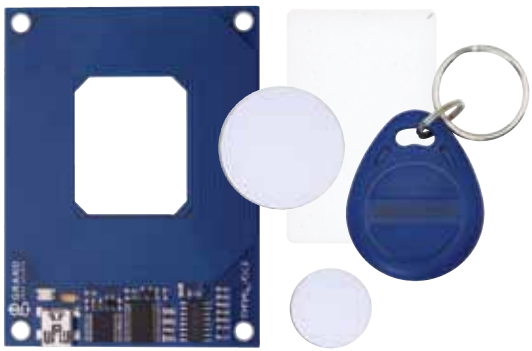
FEATURES:

- Easy USB connection to PC
- 2400 bps serial interface through USB virtual COM port
- Powered by USB (no external power required)
- Bi-color LED for visual indication of activity

USB A to Mini-B cable (sold separately; #805-00006; $3.99) is required for connection to a PC.

Do you have a custom computer application for the RFID Reader Module USB (#28340) in mind? Take a look at Chris Savage's open-source RFID Reader application. Written in VB.NET using Microsoft Visual Basic Express 2008, the RFID Reader application provides a simple graphical user interface to open a COM port and read, display, and log EM4100 RFID tag IDs. Because it is open-source, you can customize it to for your own project or use it as an example when writing your own programs.

RFID Reader (USB) & Tag Sampler - #32395; $42.99 - Includes RFID Card Reader USB Module, 54 x 85 mm Rectangle Tag. 50 mm Round Tag, Blue Eye Key Fob Tag, 25 mm Disc Tag.



433 MHz RF Transceiver Module - #27982; $39.99 - This easy to use and low cost module is capable of sending and receiving serial data wirelessly between microcontrollers or to a PC. The low power consumption makes this module ideal for use in battery powered applications. This module sends and receives data by AM or CPCA modulation, thus offering a higher average output power which extends its range. This module is equipped with an RSSI feature that can be utilized to improve power efficiency by waking up circuitry only when an external signal is detected. 3.3 to 5.0 VDC; Transmit: 12 mA, Receive: 6.1 mA, Power Down: 11.5 µA.

FEATURES:

- High speed data transfer rates: 1200-9600 bps
- Asynchronous serial data (TTL/CMOS compatible)
- SIP header allows for ease of use with breadboards
- Power-down mode for lower average current consumption (Longer battery life)
- Line of sight range of 300-2500 feet (depending on operating conditions)

APPLICATION IDEAS:

- Remote controlled Boe-Bot robot
- Wireless data acquisition
- Remote signal beacon for adventure seekers
- Remote industrial monitoring
- Lighting control
- Keyless entry

Easy Bluetooth Module - #30085; $69.99 - An effective and low-cost solution to free your hardware applications from wires. The module is small in size, and with its SIP header design, it can fit on any 0.1" spacing breadboards for rapid prototyping. The module is compliant with Bluetooth 1.x and 2.0 allowing it to communicate with a broad range of Bluetooth devices. The Easy Bluetooth Module is compatible with all the Parallax microcontrollers.

The module has two parts, the RBT-001 module and the SIP with voltage regulator PCB. With the on-board regulator, the module can be connected to voltages higher than 3.3 VDC (such as the 5 VDC Board of Education) without worry of damaging the unit, while the RX and TX can utilize serial communication at CMOS and TTL levels.

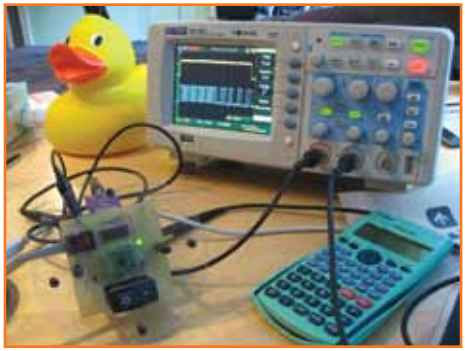
FEATURES:

- 1.x & 2.0 Bluetooth compliant
- Easy serial communication
- Class 2 operation (nominal range up to 30 m)
- Low power consumption
- On-board regulator for safe operations across various voltages

2010 RF DESIGN CONTEST

In 2010 we ran our first RF Design Contest in collaboration with Linx Technologies.

Our first place winner, Vijay Singh, PhD, used a Propeller chip and a RF Transceiver in his project:
The "**Wireless Vineyard Monitor**" is a weatherproof box that houses electronics mounted on a PVC support pipe. Soil temperature is measured by a sensor at the bottom of the pipe. The soil moisture sensor is located on an extension cable so that it can be placed anywhere within a few feet of the monitor. Air temperature and humidity sensors are located midway up the pipe with drilled holes to permit air exchange, and the solar radiation sensor is on top of the electronics box. The whole unit is very compact and can be placed anywhere without the need for any wiring. Data is sent wirelessly to a host PC located up to 100 feet away. The core of the device is a Parallax Propeller chip which handles all the data acquisition and communication needs. The compact board contains the Propeller chip along with essential peripherals.



Our second place winner, Laurent Goudet, used a accelerometer and a RF Transceiver in his project:
The "**WatchDuck**" is a wireless pool alarm. This alarm is composed of two parts: the detector and the base station. Mounted into a bath ducky, the detector uses an accelerometer module (#28026; page 88) to measure the vertical acceleration (Z-axis). When an object falls into the water, the waves are detected by an accelerometer. When the G-force detected is above a threshold, the detector sends an alert to the base station which triggers an alarm. The base station has a second RF Transceiver and a user interface with a 2x20 LCD and 4 touch keys.

NEW! Smart Card Reader - #32320; $9.99 - A low-cost solution for reading and writing data to contact memory-based smart cards and is compatible with both the BASIC Stamp and Propeller microcontrollers. Today, smart cards are used in a wide variety of applications from health care to personal finance. They are ever-increasing in popularity due to their convenience and security. Generally, smart cards are about the size of a credit card with an embedded IC for storing data. Our Smart Card Reader can be used with the compatible Smart Cards (right) for a variety of applications such as security systems, data storage, tracking systems, and identity authentication.

FEATURES:

- Low-cost solution for reading and writing data to standard smart cards
- Compatible with most memory-based smart cards (not compatible with micro processor-based smart cards)
- Card detect switch allows confirmation of smart card insertion
- Dual-row SIP header for breadboard stability and easy prototyping
- Mounting holes included for use in permanent applications
- Easy interface to both the BASIC Stamp and Propeller microcontrollers

The pins of smart cards are accessible through the gold plated contact pads embedded in the card. Paired with the Smart Card Reader connected to a BASIC Stamp, Propeller, or other microcontroller, smart cards can be used for data storage, security systems, tracking systems, or identity authentication. All 3 cards have 1,000,000 erase/write cycles with 100 year data retention.

NEW! IS23SC4442 Smart Card - #32321; $0.99 - Provides 256 x 8-bit serial EEPROM. 2.5 ms write time. 3-byte Programmable Security Code for memory write/erase protection and 3-bit error counter.

NEW! IS24C16A Smart Card - #32322; $1.29 - Provides 2048 x 8-bit serial EEPROM, in eight 16-byte pages. 5 ms max write time with auto clear.

NEW! IS24C02A Smart Card - #32323; $0.99 - Provides 256 x 8-bit serial EEPROM. 5 ms max write time with auto clear.

Memory Stick Datalogger - #27937; $34.99

- A USB host bridge which allows you to connect a USB mass storage device, such as a thumb drive, to your BASIC Stamp, SX or Propeller microcontroller. The Vinculum Chip on the Datalogger handles the file system of the Memory Stick so that you can share the files with your PC using simple serial commands. This device is ideal for remote logging of large quantities of data, and hosting large database for RFID Access Control or other applications.

FEATURES:

- Simple Serial or SPI interface to microcontroller
- Extended or Short Form Command Set/Responses
- 5 V supply with 3.3/5 V safe I/O
- Easy firmware update (can be field-updated)

KEY SPECIFICATIONS:

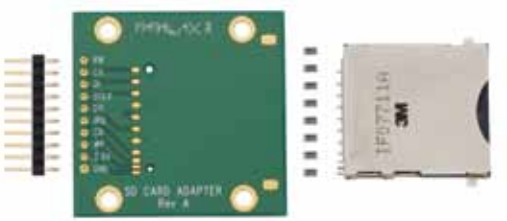
- Power Requirements: 5 V Supply with 3.3 V/5 V Safe I/O
- Communication: Simple Serial or SPI interface to microcontroller
- Dimensions: 1.96 x .86 x .19 in (50 x 22 x 5 mm)
- Operating Temperature: +32 to +158 °F (0 to +70 °C)

Easily connect a Flash Memory Card to your Propeller chip or other microcontroller (not compatible with BASIC Stamp). This adapter contains the components required for an SPI interface between the host microcontroller and an SD memory card. The SD Card Adapter Kit includes a card detect switch which allows you to detect when a memory card is physically present in the socket. Easy SIP interface, and mounting holes so you can install it in your application. Requires 3.3 VDC.

micro-SD Card Adapter - #32312; $14.99

SD Card Adapter Kit - #32313; $14.99

- *This product comes as a kit and requires soldering.* Also includes a R/W switch to determine the read/write status of the inserted card, preventing accidental loss of data.



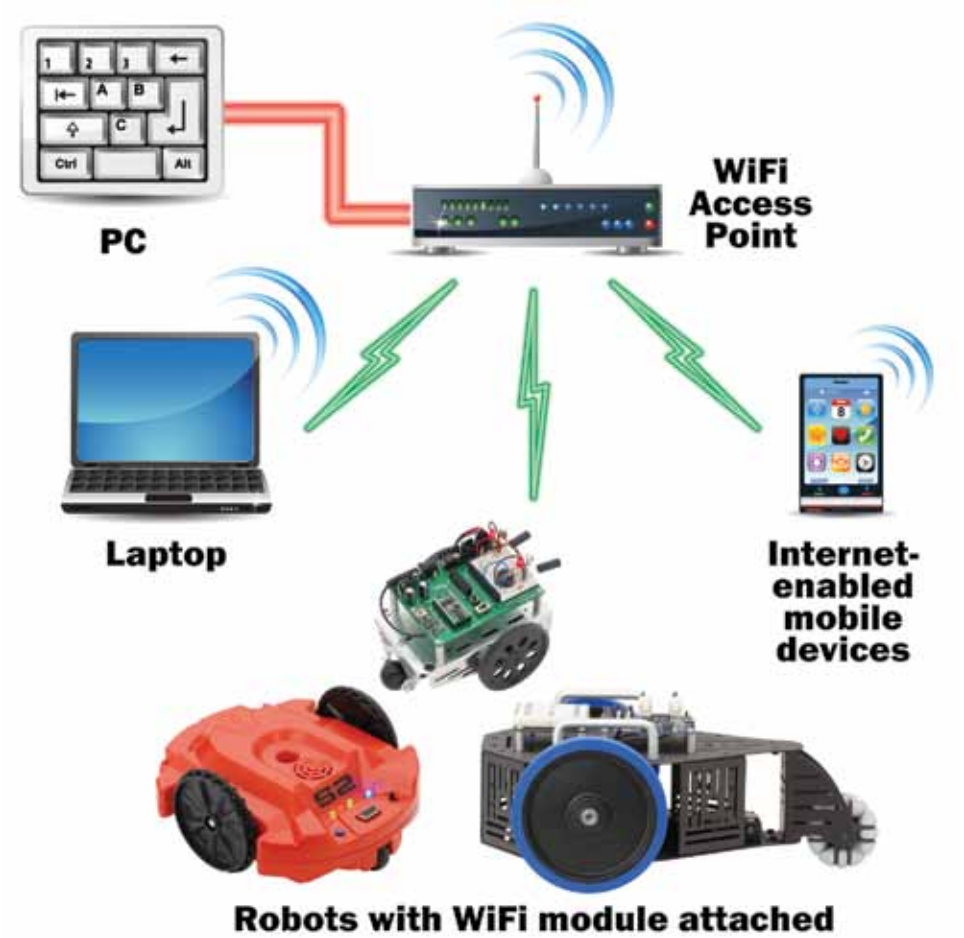
GPS Receivers

The comparison chart below includes our breadboard-friendly GPS Module (#28146), which features a co-processor for ask/receive making it particularly useful for BASIC Stamp projects. All modules send out the entire NMEA0183 GPS string. All are compatible with the BASIC Stamp and Propeller, too. You can find source code examples at www.parallax.com.

	Parallax GPS Module	PMB-648 GPS SiRF Internal Antenna	PMB-688 GPS SiRF Internal/External Antenna	RXM-SG GPS Module w/External Antenna
Stock Code; Price	**#28146; $79.99**	**#28500; $34.99**	**#28501; $39.99**	**#28505; $79.99**
Antenna	Built-in patch	Built-in patch	Built-in patch or optional external (#28502; $9.99)	External antenna included
Interface	4-pin SIP header; TTL @ 4800 bps	Stripped wire cable assembly, TTL/RS-232 @ 4800 bps (9600, 19200, 38400 optional)		11-pin SIP header or USB @ 9600 bps (4800, 19200, 38400, 57600 optional)
GPS Chipset	Sony CXD-2951GA-4	SiRFstar III		
Satellite Tracking Channels	12	20		
Update Rate	1 Hz			
Output	Formatted individual data or raw NMEA0183 V2.2	NMEA0183 V2.2 or SiRF Binary		
Power Supply	5 VDC	3.3 - 5 VDC		5 VDC
LED Function	LED On: Signal Valid LED Flashing: Signal Not Valid LED Off: No Power			LED Blinking: Signal Not Valid, Pulsing @ 1 HZ: Signal Valid
Operating Temperature	+18 to +78 °C	-28 to +78 °C		-30 to +85 °C

WiFi Modules

Ever wish you could free your robot (or any other electronic project) from the tangled confines of wires and cables? Look for our new line of WiFi Modules to provide easy communications over WiFi to anywhere in the world. The modules can even wirelessly reprogram BASIC Stamp and Propeller microcontrollers! **Stay tuned for more details.**



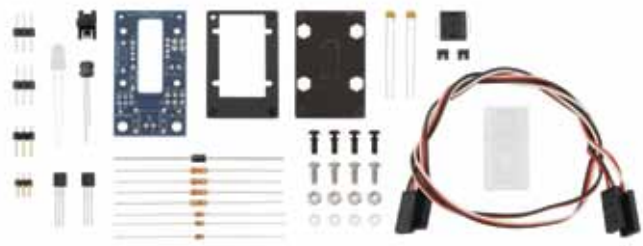
Human Interface Devices

2-Axis Joystick - #27800; $4.99 - Add analog input to your next project. The 2-Axis Joystick contains two independent 10 K potentiometers (one per axis) for reporting the joystick's position, with wiring options for voltage or resistance outputs. Breadboard friendly for easy prototyping, with spring auto return to center and a comfy cup-type knob. Dimensions: 1.64 x 1.2 x 1.1 in (41.7 x 30.5 x 27.7 mm)

5-Position Switch - #27801; $4.99 - Provide directional output to your project! This switch has a nice snappy feel, and returns to the center/unpressed position immediately when released. By monitoring the input state of five pins, it's easy for any Parallax microcontroller to detect whether the switch is in the up, down, left, right, or pressed position. Dimensions: 0.70 x 0.95 x 0.78 in (17.8 x 24.1 x 19.8 mm)

Mouse Sensor Kit - #28560; $19.99 - The Parallax Mouse Sensor is a module in kit form which, when assembled, provides the tracking functions of an optical mouse. The two-wire serial interface is directly compatible with the BASIC Stamp 2 family, the Propeller, and other microcontrollers. This kit has a distinct advantage for experimenters over off-the-shelf computer mice, in that the mechanical parts are more hacker-friendly, and the programming does not rely on interfacing to (or bypassing) a USB or PS/2 connection. Assembly required. Dimensions: 1.8 x 1.0 x 0.65 in (45.7 x 25.4 x 16.5 mm)

Trackball Module - #27908; $14.99 - Similar to the trackball found on many smart phones, this sensor is easily portable and can be used to replace a mouse in many applications. The Trackball Module comes with a built in center select switch and a red LED which can be programmed to light up the trackball when desired. Dimensions: 1.0 x 1.0 x 0.67 in (25.4 x 25.4 x 17.08 mm)



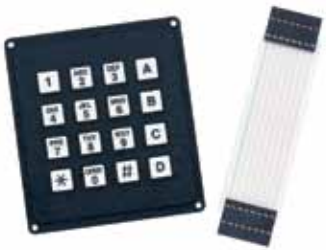
Absolute Binary Rotary Encoder - #27804; $9.99 - A mechanical encoder capable of rotating a full 360° in both the clockwise and counterclockwise directions without limits. This device can also relate its current position relative to one of sixteen points on the encoder. The Absolute Binary Rotary Encoder is compatible with any Parallax microcontroller and sample code for the BASIC Stamp 2 and Propeller chip are available. Dimensions: 0.8 x 0.75 x 0.73 in (20.32 x 19.05 x 18.67 mm)

NES Gamepad Controller Adapter - #32368; $4.99 - Easily connect up to two NES-style gamepad controllers to a breadboard or through-hole board project. The printed circuit board has two **Nintendo gamepad (sold separately; #32365; $4.99)** compatible sockets routed to a dual row of pins for stability, with data connection indicator LEDs and built-in series resistors for I/O pin protection. Dimensions: 3.1 x 1.6 x 0.91 in (79 x 41 x 23 mm)

NES Controller Socket (#450-32360; $1.99) also available.

NEW! Incremental Rotary Encoder - #27805; $4.99 - Provides 16 pulses per revolution via 2-bit quadrature outputs. Easy breadboard connection. Rotates continuously through 360° and provides detent to hold position. Used with a pushbutton this encoder could provide a complete menu/input system for your microcontroller. Dimensions: 0.925 x 1.02 x 1.093 in (23.50 x 25.91 x 27.76 mm)

4x4 Matrix Keypad - #27944; $19.00 - This Grayhill keypad has conductive rubber contacts with an operational life of 3 million cycles, and a good tactile feel for positive feedback. The **4 x 4 Matrix Keypad Cable (sold separately; #27943; $7.99)** is recommended.



AVRSimon Game Kit - #28905; $19.99 - ***Soldering required.*** Do-it-yourself game kit based on the Milton Bradley game of Simon. A great way to learn about electronics, basic microcontroller functions such as reading switch inputs, turning LEDs on and off, and generating sounds. Fully reprogrammable, so you can modify the game.

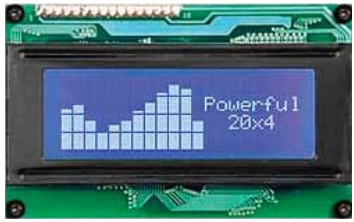
Parallax Serial LCD

- **2x16 Non-Backlit - #27976; $24.99**
- **2x16 Backlit - #27977; $29.99**
- **4x20 Backlit - #27979; $39.99**

Functional, affordable solutions for adding displays to your microcontroller applications. They support ASCII decimal characters 32-127 (the same characters in the BASIC Stamp Editor's Debug Terminal). You may also define up to eight custom characters. Text wrapping is automatic. Additional control codes allow cursor to be placed anywhere, and turn the display on/off with a single instruction. Simple 3-pin SIP connection.

FEATURES:

- Switch-selectable baud rates: 2400, 9600, and 19200
- Adjustable contrast dial
- 5 VDC; 20 mA (light off), 80 mA (light on)
- Operating temperature: -4 to +158 °F (-20 to +70 °C)
- Dimensions: 2x16 module, 1.5 x 3.15 in (3.8 x 8 cm); 4x20 module, 2.4 x 3.9 in (6 x 10 cm)



4x20 Serial LCD with Keypad Interface - #30058; $99.99

Do you need more general purpose outputs (6), a keypad interface (up to 5x5 Keypad), and a cool blue screen? The Matrix Orbital part number is LK204-25-WB. This display has been pre-modified for BASIC Stamp compatibility (TTL level). Dimensions: 3.85 x 2.36 x 1.08 in (98 x 60 x 27.5 mm)

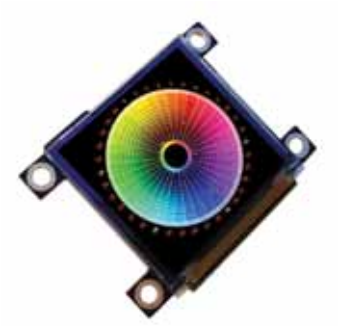
FEATURES:

- Communicate over RS-232 or I²C (Connect up to 16 displays over I²C)
- Display text, horizontal & vertical bar graphs and large digits
- Line wrapping, scrolling, contrast, backlight and time-out setting (up to 180 minutes)
- Operating temp: 32 to 122 °F (0 to +50 °C)
- Supply voltage: 4.75 to 5.25 VDC
- Supply current: 10 mA typical
- Backlight supply current: 90 mA typical

LCD/Servo Extension Cable

- **10 in - #805-00011; $2.25**
- **14 in - #805-00012; $2.79**

Cables come with 3-pin male/male header for easy breadboard/through-hole connections for LCDs and servo motors.



µOLED-128-G1 - #27925; $64.99 - This display uses simple commands to control foreground and background color. It can produce text in a variety of sizes and draw shapes (including user-defined bitmaps) in 262,000 colors. Compatible with all Parallax microcontrollers. Create an electronic panel meter or gauge for instrumentation or automotive applications, a mini billboard for advertising or a display for handheld diagnostic or medical equipment. On-board Micro-SD memory card connector to add memory for storing of icons, images, animations, etc. Dimensions: 1.5 in. (38.1 mm) diagonal display (module size 45.5 x 33.5 x 8.8 mm)

FEATURES:

- 128x128 pixel res., 65 or 262 K color
- Easy 4-pin interface to host (Vcc, TX, RX, GND, Reset)
- Voltage supply 3.6 to 6.0 V; 40 mA nominal @ 5.0 V
- 3.3 V Serial interface with auto-baud feature (300 to 256 K baud)
- Serial lines are 5 V tolerant using 1K resistor on the RX line
- Built-in graphics commands: LINE, CIRCLE, RECTANGLE, TEXT, USER BITMAP, BACKGROUND COLOR, PUT PIXEL, IMAGE, etc.

Mini LCD A/V Color Display - #603-32000; $69.99 - This 7 inch LCD A/V PAL/NTSC display features a 480 x 240 pixel color screen and a built-in speakers. Conveniently portable, this product can display NTSC video output generated by the Propeller chip or any other device which has an Audio/Composite Video Out connector.

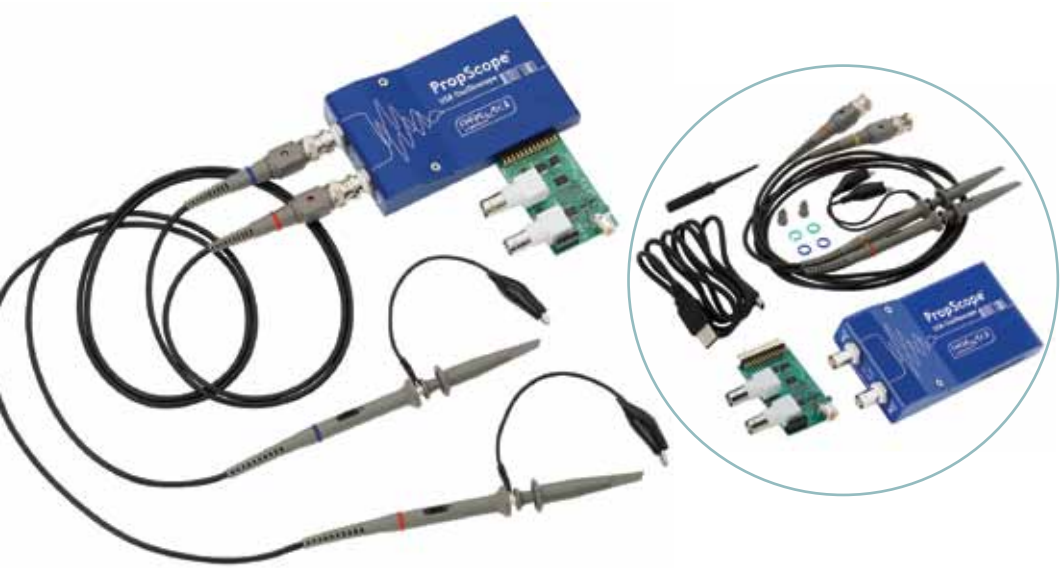
FEATURES:

- 7 inch (170 cm) TFT display panel
- PAL/NTSC auto select
- 480 x 240 pixel resolution
- Dual Video input, 1 Audio input
- Built-in speaker

KEY SPECIFICATIONS:

- Power requirements: +12 VDC; 300 mA
- Communication: PAL/NTSC format
- Dimensions: 4.72 x 6.69 x .79 in (120 x 170 x 20 mm)
- Operating Temperature: +32 to +122 °F (0 to +50 °C)

This display is also sold as a part of the Propeller Peripherals Kit (see page 15; #32311; $99.99).



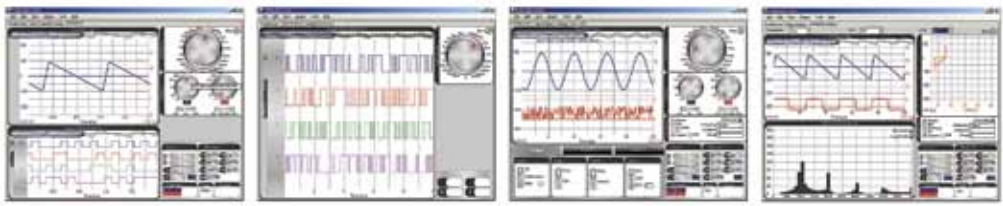
PropScope USB - #32220; $249.99 - The PropScope is a two-channel oscilloscope that is capable of reading 25 million samples per second with ten bits of resolution over one, two, ten, or twenty volt peak-to-peak waveforms. Power is provided through the USB port requiring only a single cable to connect the PropScope to any laptop or desktop PC. The built-in expansion port allows additional capabilities and upgrades. The included expansion card provides an analog trigger, a four-bit digital trigger, an eight-bit digital to analog converter, and a four-bit NTSC/PAL output. The included software provides a traditional scope interface along with auto measurements, a spectrum analyzer, and the ability to store and export waveforms.

FEATURES:

- 25 Msps Maximum Sample Rate
- 20 Vpp maximum input range (-10 to +10 V when DC-coupled)
- 10-bit input resolution over either the entire 20 Vpp range, or selectable 10, 2, and 1 Vpp ranges.
- 1x/10x selectable probes

INCLUDED EXPANSION CARD FEATURES:

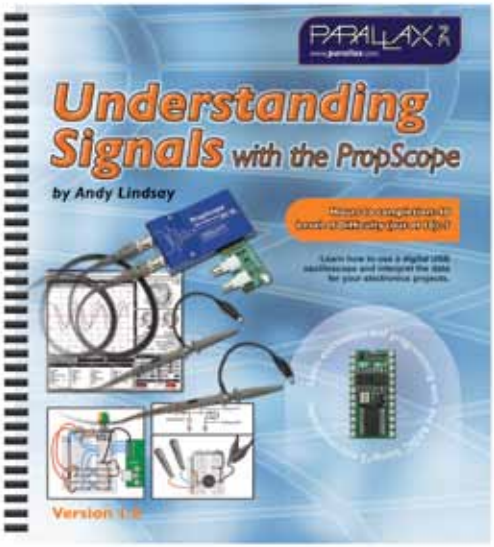
- External analog trigger with a -10 to +10 V input range
- 4-bit digital input and trigger
- Arbitrary waveform generator with an 8-bit DAC and selectable -1.5 to 1.5 and 0 to 4.9 voltage ranges
- 4-bit DAC for generating NTSC and PAL signals



NEW! *Understanding Signals with the PropScope*

- **Parts & Text Kit - #32225**
- **Text Only - #122-32225**

See www.parallax.com for details



This kit includes the PropScope USB, electronic components for breadboard project circuits, and a 350+ page book that guides you step-by-step from the basics through advanced electronic measurement techniques.

All the circuits and technique examples in the book are standard ingredients in electronic product design, and are also widely used in science and industry. A versatile resource, the activities can be applied in many ways to science, technology, engineering, or mathematics (STEM) programs. It begins with an overview of the PropScope's electronic test-bench tools that are used throughout the book:

- DC voltmeter – measures voltage levels
- Oscilloscope – measures and plots voltages that vary with time
- Logic analyzer – measures and plots digital signal levels
- Spectrum analyzer – measures and plots sine wave components in signals
- Function generator – synthesizes signals for testing circuits

The lessons are designed so that a beginner can succeed in the classroom or through independent study. In the hands-on Human-Speed Measurements chapter, the student builds and interacts with circuits for turning dials, pressing buttons, and blinking lights. The cause-and-effect relationship between the physical action and the changing signal is experienced by direct observation as well as by measurements with the PropScope's tools. This helps make new concepts easier to grasp, and better prepares the student for the "high-speed" electronics topics that follow. **The full sequence includes:**

- DC voltages and currents
- "Human-speed" measurements
- Digital: pulses for control and synthesizing signals
- Digital: microcontroller–integrated circuit communication
- Digital: microcontroller–PC communication
- Analog: sine waves in signals, and how filters and amplifiers affect them
- Analog: RC circuit responses, sensor measurements, and simple filters
- Analog: basic amplifier building blocks

Note: Board of Education and BS2 (page 31) or BASIC Stamp HomeWork Board (page 32) required, sold separately.

Stamp PLC - #30064; $199.99

- This Program Logic Controller is sized for automating small machines. PLCs are packaged to withstand the hazards of an industrial environment. Inputs and outputs are optically isolated, fully protected, and the electronics are electrically tough and rather immune to noise typically present in an industrial setting.

The Stamp PLC is housed by a strong enclosure that offers an integral DIN rail mount. Unlike PLC's which have proprietary code, you may create your own code customized to fit your needs. This non-restrictive power will allow you to design and modify your systems much faster. **A 24-pin BASIC Stamp 2 module is required and sold separately.**

FEATURES:

- 24 V industrial control in DIN rail package
- 10 digital inputs; 8 digital outputs; 4 analog inputs provides control flexibility
- 4 analog inputs. Each channel can be independently configured as 4-20 mA, 0-5 VDC, -/+ 5 VDC, -/+ 10 VDC.
- RS-232 serial port
- Front panel LEDs indicate the status of all ten inputs and all eight outputs via a light-pipe array.

Stache: BASIC Stamp Field Programmer - #27330; $99.99

- A palm-sized module for loading up to 15 PBASIC programs into BS2 through BS2pe modules under field conditions. Any PBASIC program you write on a PC can be downloaded into the Stache, after which you can transport the Stache to another location and deliver the program to your BASIC Stamp module with a press of a button.

The Stache is a great tool for anyone who sets up BASIC Stamp-based equipment in difficult locations (i.e.: anywhere you do not want to carry or operate a PC). No cables to attach, no software to boot, no ports to configure, and no need to have on-site personnel or customers see your program code. The Stache can be operated by untrained personnel, working in less than ideal conditions, where the process of loading a program into the BASIC Stamp microcontroller must be fast, foolproof and secure.

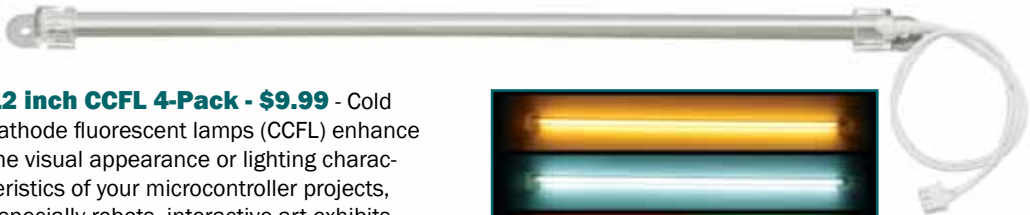
Program size is 2K (accommodating a full BS2 program or one of eight slots for a BS2p program).

9 V battery required (not included).

12 V Power Inverter for CCFL - #750-00060; $4.99 - This inverter is an electrical device that converts direct current (DC) to alternating current (AC); converting 12 VDC to ~660 VAC. The Inverter is used with the CCFL light bars that Parallax offers; each inverter controls up to 2 tubes.

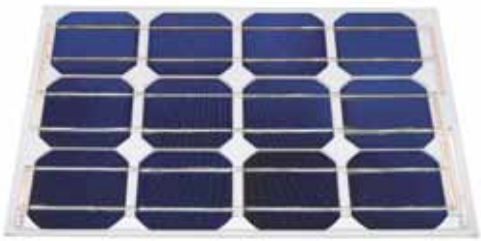
FEATURES:

- Convert DC to AC voltage to be used with AC lighting
- 2 connection ports for the CCFL light bars
- Power connector with bare wires for easy connections



12 inch CCFL 4-Pack - $9.99 - Cold cathode fluorescent lamps (CCFL) enhance the visual appearance or lighting characteristics of your microcontroller projects, especially robots, interactive art exhibits, and entertainment projects. CCFL tubes are packaged in a 4-pack. Order any of the CCFL part numbers and you will receive four (4) CCFL tubes of the same color. Approximate colors shown at right.

- **Yellow - #801-00001**
- **White - #801-00002**
- **Red/Green - #801-00003**
- **Red/Blue - #801-00004**
- **Red - #801-00005**
- **Purple - #801-00006**
- **Green - #801-00007**
- **Blue/Red/Green - #801-00008**
- **Blue/Green - #801-00009**
- **Blue - #801-00010**



NEW! 30 Watt Solar Panel Kit - #33000; $139.99 - Ready for a do-it-yourself system that can produce up to a maximum of 30 watts of clean green electrical energy? The energy produced per square foot is comparable to many commercially available solar panels. When permanently sealed, the panel can withstand the outside elements as well. *Our online demonstration videos show you how to properly handle and solder the delicate cells and their wiring interconnections.*

Additional 2.5 Watt Solar Cells

- **Single Cell - #750-00034; $9.99**
- **6-Pack - #750-00035; $39.99**
- **13-Pack - #750-00036; $79.99**

FEATURES:

- Array of 12 commercial-grade 125 mm (~5”), 2.5 watt, 16.75% efficiency mono crystalline solar cells
- UV stabilized polycarbonate base and cover panels provide outdoor durability and high light transmission properties without the fragility of glass or brittleness of acrylic
- Custom-milled base panel with a protective recess for each cell simplifies assembly
- Daisy-chain multiple units together for higher voltage/current/power output

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Solar Panels - Parallax solar panels are easy-to-use and would make a great addition to your next solar powered project. Multiple units can be chained serial and/or parallel to increase voltage and current. *These Solar Panels are not surplus or overstock. These quality panels are custom made for Parallax to our specifications.*

- **6 V @ 1 W, 125 x 63 mm - #750-00030; $7.99**
- **4-Pack of 6 V Solar Panels - 33001; $25.00**
- **9 V @ 1 W, 135 x 135 mm - #750-00031; $9.99**
- **18 V @ 10 W, 340 x 280 mm - #750-00032; $59.99**

Interview with Matt Gilliland

Creator of the 30 Watt Solar Panel Kit

Q. How did you first become acquainted with Parallax?

A. It was the late 1990s and I had just completed my part in the development of a middle-school basic electronics educational program. I noticed a post on the Parallax Forums from Ken Gracey. He was looking for some input in developing an "educational program" that would use the BS2 as the core device, and teach basic electronic and microcontroller theory and applications. I responded to his post, and was invited down for a visit. After a couple of brain-storming sessions we came up with the first version of the Board of Education. There wasn't a huge amount of beginner level documentation at the time, so I was commissioned by Ken to write a series of lessons. The title for the original docs was something that I had asked myself many times before: "What's a Microcontroller?" After my first few versions, Andy Lindsay took over, and the rest is history!

Q. What do you do at Parallax?

A. A better question might be: What don't I do? Well, I don't program well at all – I'm surrounded by incredibly gifted people that obviously LOVE what they do. I'm certainly spoiled, because I know that if I need some code – I can walk through the building and get help from so many talented people, it makes my head Spin (pun intended). In reality, I don't think of Parallax as work. Here I get to play in the greatest "sandbox" ever. I'm primarily a hardware guy and a robotics enthusiast. I do attempt to support the engineering staff, the machine shop, and anyone else that needs a hand.

Q. What kind of product designs are you involved with at Parallax?

A. I'm working on several solar applications, battery and power management circuits, and of course anything to do with robotics. I think the opportunities that these fields promise are astounding.

Q. What parts of your work do you most enjoy, and which do you find the most difficult or demanding?

A. I really like the melding of microcontroller "intelligence" with mechanical "action" – Real World Control is what it's all about for me. The most difficult part of my work is trying to understand Parallax's inventory control system, and how to NOT mess it up - Scared? Heck, yes I'm scared!

Q. Rewards and personal reward are important parts of everybody's work satisfaction. What's your "currency" in this regard?

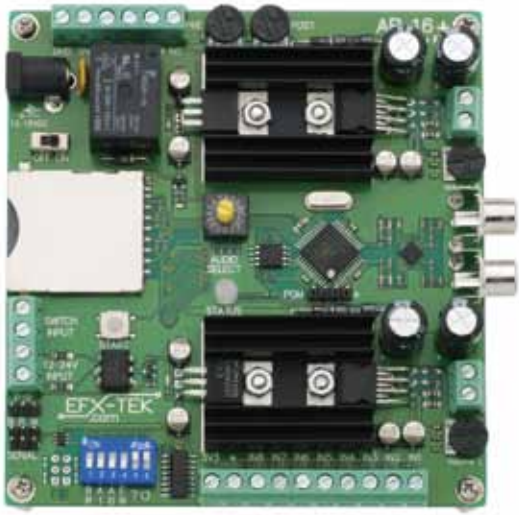
A. Few things are as rewarding to me as seeing a "light bulb go on" in somebody's head. Helping to cause that "Ah ha!" moment in people is one of the best rewards I can think of.

Q. For customers starting some kind of American-made production what kind of suggestions would you give them?

A. Stick to what you believe in, and see it through to the end, in spite of detractors and naysayers. Thomas Edison, when asked why he kept trying to build a light bulb after so many failures retorted: I have not failed. I've just found 10,000 ways that won't work. And of course don't forget that "Opportunity is missed by most people because it is dressed in overalls and looks like work.

Q. Your goals at Parallax for the next year?

A. "Do what the boss tells me to do today so that I can come back to play tomorrow." Oh, you mean seriously? Develop as many cool and useful circuits, robotics components, and applications as humanly possible.



AP-16+ Audio Player - #31316; $129.99 - Now controlling powerful, booming sound is as simple as loading up your SD card! The AP-16+ allows you to playback high-quality, stereo WAV files for your standard SD card through two, booming 20 W amplifiers (one per channel).

Advanced features like built-in randomization, auxiliary inputs, and the ability to use dry-contact, (optically isolated) 12 to 24 DC, or a PIR (or compatible) sensor put the AP-16+ in a class of its own. For stand-alone control the AP-16+ includes pre- and post-play delay potentiometers, as well as a relay that is active while your audio plays. Need background audio while your prop is idle? No problem, the AP-16+ includes an ambient loop control to do just that. Dimensions: 4.25 x 4.50 in (107.95 mm x 114.30 mm)

Power supply and speakers are not included. We suggest the **18 VDC, 3 Amp Power Supply - #750-00011; $34.99**

FEATURES:

- Propeller microcontroller on board
- Plays stereo WAV files (16-bit, PCM, up to 44.1 kHz)
- Files stored on standard SD card (FAT or FAT32 format)
- 24 stand-alone files under manual control
- Optional, auto-playing ambient file (AMBIENT.WAV)
- Manual input via (normally-open) dry-contact, (optically isolated) 12-24 VDC input, or PIR sensor
- Eight, dry-contact auxiliary inputs
- Relay output active when file plays (N.O. and N.C. connections provided)
- Pre- and post-play delay potentiometers (manual mode, only)
- Dual 20 W amplifiers (one per channel)
- TTL serial control for connection to host microcontroller - unlimited files under serial control
- User-configured baud rate (2400 or 38.4 k) for serial control
- User-configured address allows up to four AP-16+ boards on one serial connection
- Four, 0.135 inch (3.4 mm) mounting holes
- Easily updated as new features become available – update loads from SD card (not included)

Say It Module - #30080; $59.99 - Add voice recognition functionality for 23 built-in pre-programmed or up to 32 user-defined commands. The Say it GUI software for the BASIC Stamp 2 provides an interface for training the module and producing template code. Create a voice controlled Boe-Bot robot. Or, use the robust serial protocol to access the Say It Module functions from other microcontrollers. Dimensions: 1.03 x 2.48 x 0.51 in (26.21 x 63.22 x 13.20 mm)

FEATURES:

- 23 pre-programmed Speaker Independent (SI) commands
- Up to 32 user definable commands
- SIP header for breadboard friendly projects (0.1 inch spacing)
- LED and microphone on-board for ease of use
- Creates template programs for the BASIC Stamp 2 in the GUI software

SoundPAL - #28825; $14.99 - A tiny module that plays canned and custom sound sequences. It is completely self-contained, including a microcontroller for generating the sounds and a small speaker for producing them. The SoundPAL interfaces easily to a BASIC Stamp and can play sounds while the BASIC Stamp is busy with other chores. Dimensions: 0.9375 x 0.75 x 0.25 in (24 x 20 x 8 mm)

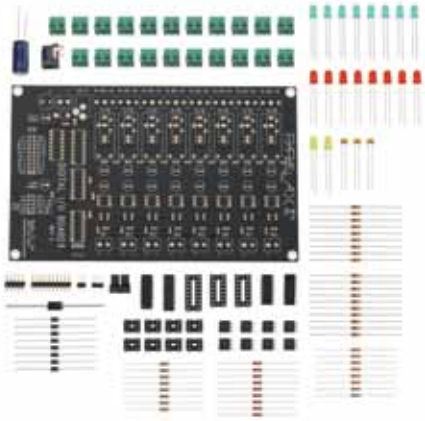
FEATURES:

- Plugs into servo headers, and works with protoboards.
- Single-pin interface
- Total audio range is 6½ octaves in four different tempos and four playing styles.
- Onboard EEPROM permits saving custom sound sequences for later playback.
- Autoplay feature permits playing a pre-designated EEPROM sequence with only a power supply.

Sound Impact Sensor - #29123; $7.99 - Detect sound from up to 3 meters away, lending noise-activation possibilities to your project. This sensor also includes an onboard potentiometer for easy adjustment of the range of detection for the sensor. This sensor is compatible with all Parallax microcontrollers and sample code for both the BASIC Stamp 2 and the Propeller chip is available on the product page online. Dimensions: 0.6 x 1.5 in (15 x 38 mm)

APPLICATION IDEAS:

- Noise-activated alarm systems
- Holiday animated props
- Monitoring systems
- Sound-activated projects



NEW! Digital I/O Board Kit - #27113; $49.99 - Enable your microcontroller to interface to high voltage circuits allowing you to read up to 8 optically isolated inputs and control up to 8 isolated outputs. Inputs can be a voltage from 5-30 VDC (AC compatible) and outputs can be either mechanical or solid state relays that can switch up to 12 A loads, such as cooling fans, solenoids, heating elements and more.

Simple parallel input/output control for ease of use or you can use the serial interface to minimize I/O pin usage. The logic circuits operate from 3.3 to 5 V making them compatible with most microcontrollers. The ICs in the kit are all socketed making replacement easy should it ever be necessary. 8 green and 8 red LEDs indicate the status of input and outputs. 2 yellow LEDs indicate relay/logic power. Inputs can be configured to handle a different range of input voltages.

This kit requires relays to operate. We recommend **Omron 12 A SPDT (#400-00052; $1.99 each) or Sharp 8 A (#400-00053; $3.99 each) Solid State Relays**, which must be purchased separately.

FEATURES:

- Mechanical or Solid State Relay output
- Configurable Input Voltage range
- Serial or parallel interface to inputs/outputs
- LEDs indicate power & input/output status
- AppMod compatible connection for Board of Education

APPLICATION IDEAS:

- Isolated power control of high voltage current devices from your microcontroller, such as heating elements, blower fans, solenoids, lighting systems and more
- Isolated monitoring of high voltage signals such as doorbell, alarm or other signals.

12 V 1 Amp power supply (#750-00007; $9.99) sold separately.

Industrial Control with the Digital I/O Board

by Chris Savage

The Parallax Digital I/O Board Kit brings the power of industrial control interfacing to the average microcontroller user, allowing sensing and control of high-power devices, such as HVAC systems, ventilation fans, household lighting and more. The Digital I/O Board comes as a kit that you assemble by soldering the various components onto the included PCB. The result is a robust interface that can connect to any microcontroller system via serial or parallel.

The parallel system makes it easy for even novice programmers to control the output relays by simply making a pin high or low. Likewise the inputs can be read simply by reading the state of an input pin on the microcontroller. More advanced programmers can take advantage of the dual synchronous serial interface, reducing pin count significantly.

The Digital I/O Board requires a 12 V power supply (#750-00007) to operate the relays and will interface with both 3.3 and 5 V microcontrollers by powering the on-board logic from the microcontroller's regulated power supply. You can even feed the 12 V from the Digital I/O Board to the microcontroller board so that you only need a single power supply for both boards.

To interface a Board of Education (BoE) to the Digital I/O Board and power the BoE from the same board you connect the V+ from the Digital I/O Board to the VIN on the Board of Education. Next connect the VDD from the Board of Education to the VDD on the Digital I/O Board. Whenever power is connected to the Digital I/O Board, the BoE will be powered and the interface will run at 5 V provided by the BoE.

The demo pictured here shows the Digital I/O Board driving eight 110VAC/25W light bulbs in standard sockets mounted to a piece of particle board. The lights are powered from a standard wall receptacle, as is the 12 V supply for the Digital I/O Board. The power circuitry was mounted inside a clear electrical enclosure for safety, while allowing the circuits to be viewed in action. Eight solid-state relays (facing page; #400-00053) were used to drive these bulbs. As you can see, as the relays are energized and the light bulb comes on, corresponding relay indicator (red LED) lights up to show that power is on to that channel.

The control board used in the project and shown to the left of the electrical enclosure is a Super Carrier Board (page 33) with a BASIC Stamp 2 module (page 12) installed. Seven wires connect the Super Carrier Board to the Digital I/O Board; three for power and four make up the synchronous serial interface connected to P0 through P3 of the BASIC Stamp 2 Module. Links to additional projects using the Digital I/O Board will be linked from the product page on our website as they become available.

SENSORS

PING))) Ultrasonic Distance Sensor - #28015; $29.99 - An easy method of distance measurement perfect for any number of applications that require you to perform measurements between moving or stationary objects. Naturally, robotics applications are very popular but you'll also find this product to be useful in security systems projects or as an infrared replacement. You will appreciate the activity status LED and the economic use of just one I/O pin for programming. Dimensions: 22 x 46 x 16 mm (0.85 x 1.8 x 0.6 in)

FEATURES:

- Provides precise, non-contact distance measurements within a 2 cm to 3 m range (~0.75 top 10 ft)
- Simple pulse in/pulse out communication
- Burst indicator LED shows measurement in progress
- 20 mA power consumption
- Narrow acceptance angle
- 3-pin header makes it easy to connect using a LCD/Servo Extension Cable (page 74), no soldering required.

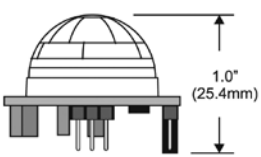
PING))) Mounting Bracket Kit - #570-28015; $19.99 - Includes a servo, the aluminum brackets and complete hardware to mount a PING))) on the front of the Boe-Bot (or any robot). By being able to move the PING))) Ultrasonic Sensor, your BASIC Stamp can perform a quick 180° environmental scan to identify the distance and location of obstacles. With this information you can effectively navigate the path with few obstructions, or hone in on an object you would like follow. *PING))) Ultrasonic Sensor and robot not included.*

PING))) Protector Stand - #725-28015; $14.99 - A precisely machined mounting bracket cut from ¼ in thick high-grade aluminum. Easy to install, this stand can gracefully attach your PING))) Sensor (sold separately) to your robot and protect the sensor from most collisions. Aperture and plastic light pipe included to allow for visual check of sensor function while mounted. Dimensions: 1.95 x 2.20 x 0.25 in (11.4 x 55.9 x 6.4 mm)

PIR Sensor - #555-28027; $9.99 - Detect motion up to 20 feet away by using a Fresnel lens and infrared-sensitive element to detect changing patterns of passive infrared emitted by objects in its vicinity. Inexpensive and easy to use, it's ideal for alarm systems, motion-activated lighting, holiday props, and robotics applications. The PIR Sensor is compatible with all Parallax microcontrollers; sample source code and product documentation are available at parallax.com. Dimensions: 0.96 x 1.0 x 1.27 in. (24.4 x 25.4 x 32.3 mm)

FEATURES:
- Simple 3-pin connection
- Single bit output, TTL/CMOS compatible
- Power requirements: 3.3 to 5 V; < 100 µA

APPLICATION IDEAS:
- Alarm Systems
- Halloween Props
- Motion-activated lighting



XBand Motion Detector - #32213; $29.99 - This sensor operates in the X-band frequency, at 10.525 GHz and indicates detected movements with oscillations in its high/low output. This type of sensor is a common ingredient in security systems and automatic door openers, and can detect movements in a room, yard, or even on the other side of a wall. Sensitivity is manually adjustable with a potentiometer, offering direct line of sight detection from roughly 8 to slightly over 30 ft (~2.4 to 9+ m).

FEATURES:
- Operation frequency of 10.525 GHz
- Detect motion through walls and windows
- More immune to false triggers than passive infrared motion sensors
- Active-high enable pin with internal pull-up resistor
- Trim potentiometer for manually adjustable sensitivity
- 4-pin SIP header for breadboard or through-hole prototyping
- Built-in series resistor for compatibility with the Propeller microcontroller and other 3.3 V devices
- Plated test point hole for monitoring pre-comparator signal

Memsic 2125 Dual-Axis Accelerometer - #28017; $29.99

- Low cost, dual-axis thermal accelerometer capable of measuring tilt, acceleration, rotation, and vibration with a range of ±3 g. For integration into existing applications, the Memsic 2125 is electrically compatible with many accelerometers.

FEATURES:

- Simple pulse output of g for each axis
- Analog output for temperature (Tout pin)
- Low current at 3.3 or 5 V operation: less than 4 mA at 5 VDC

Hitachi H48C Tri-Axis Accelerometer - #28026; $29.99

- Sense gravitational (g) force of ±3 g on three axes (X, Y, and Z). An onboard regulator provides 3.3 volt power to the H48C, analog signal conditioning, and an MCP3204 (four channel, 12-bit) analog-to-digital converter to read the H48C voltage outputs. Acquiring measurements from the module is simplified through a synchronous serial interface. With the BASIC Stamp series, for example, this is easily handled with the SHIFTOUT and SHIFTIN commands. Dimensions: 0.7 x 0.8 x .45 in (17.8 x 20.3 x 11.4 mm)

FEATURES:

- Uses MEMS (Micro Electro-Mechanical System) technology
- Onboard regulator and high-resolution ADC for simple connection to host
- Free-fall output indicates simultaneous 0 g an all axes

MMA7455 3-Axis Accelerometer Module - #28526; $34.99

- The Freescale Semiconductor MMA7455L 3-Axis Digital Output Accelerometer is a low power, micro machined sensor capable of measuring acceleration along its X, Y, and Z axes. It offers several convenient integrated features including an analog to digital converter (ADC), digital low-pass filter, and selectable sensitivity ranges of ±2, ±4, or ±8 g. This device can be easily configured to detect quick motion pulses as single taps, double taps, and 0 g (free fall) conditions on any or all axes and provides configurable interrupt pins (INT1 and INT2) for each type of event. An on-board voltage regulator, and I/O voltage level-shifters make this module especially easy to connect to virtually any microcontroller. It operates over a wide range of supply voltages from 2.5 to 5.5 VDC and communicates via SPI (Serial Peripheral Interface) or I^2C (Inter-Integrated Circuit) bus.

Melexis 90217 Hall-Effect Sensor - #605-00005; $4.99

- Measure motor RPM with this cost-effective and highly functional hall-effect sensor. Designed to be used with a bias magnet (sold separately; #605-00006; $0.79) south-facing the back (non-marked) side of the IC. Easy interface with all microcontrollers.

FEATURES:

- Short circuit protection
- Rotary position gear tooth sensing ability
- Self-adjusting magnetic range
- High speed operation
- Zero speed detection

eTape Liquid Level Sensor - #29131; $39.99 - This solid-state sensor is designed for use in non-corrosive water-based liquids and dry fluids (powders). Do away with clunky mechanical floats and easily interface with electronic control systems. The sensor's envelope is compressed by the hydrostatic pressure of the fluid in which it is immersed, causing a change in resistance inversely proportional to the height of the liquid— a lower liquid level results in a higher output resistance and vice versa. Resistance value can change by height level increments of 1/32 inch (0.79 mm).

FEATURES:

- Solid-state sensor; no moving parts
- Active sensor length: 12.6 in (320.7 mm
- Variable resistance gradient of 40 ohms/inch (16 Ω/cm) ±20%; 550 Ω (empty) to 60 Ω (full) ±20%
- Thin (0.015 inch) unobtrusive design can be used where other sensors may not fit
- Polyethylene Terephthalate (PET) substrate
- Gold-plated solder tabs
- Dimensions: 14.3 x 1.0 x 0.015 in (363.2 x 25.4 x 0.38 mm)
- Operating temp range: 15 to 140 °F (-9 to +60 °C)

FlexiForce Sensor Kit (25 lbs.) - #30056; $25.99 - This will allow you to demonstrate the resistive nature of the sensor with a resistor/capacitor discharge time measurement circuit; no correlations to weight are made. The resistance of the Flexiforce sensor is proportional to weight. The sensor included in the kit has a resolution of ≈ 1.6 lbs. The active sensing area is a .375" diameter circle at the end of the sensor. The conductive leads are easy to connect to a breadboard or through-hole area. Has an ideal output for A/D conversion - 0 V is no force and 4.2 V is 25 lbs. The RCTIME command may be used with a LOOKUP table or calibration formula to execute some math to make the output useful.

Piezo Film Vibra Tab Mass - #605-00004; $1.79 - This vibration sensor is model LTD0 manufactured by Measurement Specialties. Whether used as a vibration sensor, a flexible switch, or a frequency response device, piezo film is an interesting sensor to interface with Parallax microcontrollers. It is easy to use with the COUNT or PULSIN commands on a BASIC Stamp.

EXAMPLE APPLICATIONS:

- Alarm System Sensor
- Product Damage/Shock Detector

GAS SENSORS

Gas Sensors are used in gas detection equipment for detecting specific gases in home, automotive or industrial settings. This line of sensors can be interfaced with any Parallax microcontroller, and would be a good addition to projects needing to sense the presence of the following gases:

CO (Carbon Monoxide)
- **Module - #27931; $29.99**
- **Component - #605-00007; $4.99**

CO_2 (Carbon Dioxide)
- **Module - #27929; $36.99**
- **Component - #605-00010; $19.99**

CH_4 (Methane)
- **Module - #27930; $29.99**
- **Component - #605-00008; $4.99**

LPG (Propane)
- **Module - #27932; $29.99**
- **Component - #605-00009; $4.99**

C_2H_5OH (Alcohol/Benzine)
- **Component - #605-00011; $4.99**

Gas Sensor Sampler Kit - #27901; $99.99 - Includes one each CO, CO_2, CH_4, and LPG modules for a savings of 20%!

Modules are designed to allow a microcontroller to determine when a preset gas level has been exceeded. A potentiometer allows the set point to be adjusted manually in the presence of a known concentration of gas. Module includes removable component. Module dimensions.: 1.5 x 1 x 1 in (38.1 x 25.4 x 25.4 mm)

TSL230R Light to Frequency Converter - #27924; $5.99

- Precisely measure light using an array of photodiodes, with an output of digital square waves. The output can be either a pulse train or a square wave (50% duty cycle) with frequency directly proportional to light intensity. The TSL230R has an input dynamic range of 160 dB; meaning it can measure light over a range of 100,000,000-to-1. The sensitivity of the device is selectable and the output frequency can be scaled by one of four preset values.

FEATURES:

- High-resolution conversion of light intensity to frequency with no external components
- Programmable sensitivity and full-scale output/frequency
- TTL compatible I/O
- Absolute output frequency tolerance of ±20%

TCS230-DB Color Sensor Daughterboard - #28302; $59.99

- A complete color detector, including a TAOS TCS230 RGB sensor chip, white LEDs, collimator lens, and standoffs to set the optimum sensing distance. Plugs directly into the MOBO (page 32). The TCS230-DB can detect and measure a nearly limitless range of visible colors. Applications include test strip reading, sorting by color, ambient light sensing and calibration, and color matching, to name just a few.

TSL1401 Linescan Imaging Sensor Daughterboard - #28317; $49.99

- Give your project one-dimensional sight. The TSL1401 is designed for plug-in compatibility with the MOBO (page 32) but can be used with any Parallax microcontroller. This product is based on the TAOS TSL1401R 128-pixel sensor chip, a 7.9 mm focal length imaging lens, and control electronics to aid in capturing images for evaluation. It produces a clocked analog data output, whose voltage levels correspond to the light intensity at each pixel. By means of an analog-to-digital converter (or even a simple digital logic threshold), image data is easily transferred to a microcontroller to detect objects, edges, gaps, holes, liquid levels, textures, emissive sources, simple barcodes, and other visible features.

FEATURES:

- Focusable imaging lens
- Simple three-pin interface with analog pixel output
- Lens: 7.9 mm focal length, f/2.4 fixed aperture, manual focus, 12 mm x 0.5 mm thread
- Resolution: 128 pixels (grayscale); 255 pixels (interpolated binary)
- Direct plug-in for MoBoStamp-pe motherboard and adapters (page 36-37)

These daughterboards are directly compatible with the MOBO (page 36). If you would prefer to use a solderless breadboard we strongly recommend the DB-Expander DB-to-SIP (page 37, #28325; $9.99).

MLX90614 Infrared Thermometer

- **10° Field Of View - #28042; $39.99**
- **90° Field Of View - #28040; $39.99**

An intelligent non-contact temperature sensor with a 10° or 90° field of view and a serial interface for easy connection to host microcontrollers. The MLX90614 sensor is designed to measure objects placed within the sensor's cone of detection and is comprised of an integrated ASIC and infrared sensitive thermopile detector. The sensor communicates with a coprocessor over a digital SMBus, which has been programmed to simplify an otherwise fairly complex communication protocol.

FEATURES:

- Outputs continuous data flow with an active alarm running in background
- 16-bit temperature output data, ranging from -94 to 716 °F (-70 to 380 °C)
- Auto-baud detection (2400, 4800, 9600, 19.2 K, 38.4 K) for microcontroller-to-MLX90614 communications
- SIP module format fits easily in bread boards or through-hole prototype areas
- Multiple modules can be connected from a single I/O processor pin for serial data flow
- Can act as a stand alone sensor for alarming control
- Sleep setting for low power consumption
- Starts up active without pre-programming using preset writeable defaults

DS2760 Thermocouple Kit - #28022; $24.99 - Thermocouples provide a low-cost, reliable means of measuring temperature over a wide range. Kit supplies a complete connection between a microcontroller and a standard thermocouple element, with cold junction temperature compensation. Its 1-Wire protocol is supported by the BASIC Stamp 2p series and 1-Wire objects for the Propeller chip.

INCLUDES THERMOCOUPLE ELEMENTS:

- K-Type (Chromel/Alumel): 32 to 1873 °F (0 to 1023 °C)
- J-Type (Iron/Constantan): 32 to 1873 °F (0 to 1023 °C)
- T-Type (Copper/Constantan): 32 to 752 °F (0 to 400 °C)

AD592 Temperature Probe - #28130; $15.99 - This convenient analog temperature sensor used in the Applied Sensors parts kit (page 39) has attached wire leads, a submersible tip, and a performance range of -13 to +221 °F (-25 to + 105 °C).

Sensirion SHT1x Temperature/ Humidity Sensor - #28018; $35.99

- A smart sensor for both temperature and relative humidity. Its built-in analog to digital interface provides convenient 2-wire digital serial communication with your microcontroller. The only math required is a simple scale and offset. This factory calibrated sensor's high accuracy and low power consumption make it excellent for commercial, educational, or home-based projects.

FEATURES:

- Measures temperatures from -40 to +254.9 °F (-40 to +123.8 °C) with a resolution of 0.01 °C.
- Accuracy is within ±1 °C in the "room temperature" range, and within ±2 °C at the extremes.
- Measures relative humidity from 0 to 100% with a resolution of 0.03% and within ±3.5% accuracy

HS1101 Humidity Sensor - #27920; $4.99

- Based on a unique capacitive cell, this reliable sensor is designed for high volume, cost sensitive applications such as office automation, vehicle cabin air control, home appliances, industrial process control systems, or wherever humidity compensation is needed. Accepts 5 to 10 VDC.

FEATURES:

- Fast response time, with instantaneous desaturation after long periods in saturation phase
- Suitable for linear voltage or frequency output circuitry
- Operating temp range: -40 to 212 °F (-40 to 100 °C)

VTISCP1000 30-120 kPa Pressure Sensor - #27928; $29.99

- The VTISCP1000 is an absolute pressure sensor which can detect atmospheric pressure from 30-120 kPa. The pressure data is internally calibrated and temperature compensated. The SCP also provides temperature data and has 4 measurement modes as well as standby and power down mode.

All that is required to obtain pressure data in kPa or temperature data in degrees Celsius is a single multiplication using constants. Communication is via an SPI bus which also provides additional control lines such as an interrupt line and trigger input.

FEATURES:

- 4 measurement modes plus standby and power down mode
- SPI interface
- Pressure resolution: 1.5 kPa
- Temperature resolution: 0.05°C

APPLICATION IDEAS:

- Barometric pressure for weather station
- Altimeter for model rocketry
- Pressure chamber sensor
- Cabin pressure sensor (plane/submarine)

Interview with Tech Support

Dave Andreae (Parallaxian since 2000)

I have worked in the electronics field since 1996. I have an A.S. degree in electronics. I like all kinds of gadgets, new and old. I have three boys that keep me very active.

Q: Favorite type of tech emergency?
A: I like it when I can solve an instructor's question before they have to teach a class. It's a great feeling when the instructor has confidence in what they're teaching.

Q: Your favorite Parallax product and why?
A: I like the Propeller! I'll be honest, I was intimidated at first. I sat down one day and started playing with Andy Lindsay's "Propeller Education Kit Labs: Fundamentals" text. By the second chapter I was hooked! It had exercises that made you think outside the box. I'm starting to utilize the assembly language now which I never thought that I would ever understand.

Q: What kind of microcontroller projects do you like to do in your spare time?
A: There are a wide range of projects that are really exciting to do. I've been working on LED projects using the Propeller and I plan to start my next project using the Propeller on a robotic platform.

Kevin Cook (Parallaxian since 2010)

I've always been interested in how things work; taking apart old broken items and checking out all the little parts inside. I started my technical career working at Litton in Southern California as a Mainframe Help Desk technician. I continued my computer carrier for Electronic Data Systems working at Borax mining company for another eight years. I've always liked working in the technical field and being out where I could talk to people and be more interactive.

Q: Favorite type of tech emergency?
A: Helping an engineer that is trying to resolve an issue when all the parts he has tried are not working, and I'm able to locate a part we make that fits his project like it was made for it.

Q: Your favorite Parallax product and why?
A: The Propeller. It's almost limitless in what you can do with this product. It's easy to learn, has many programming options, and can give just about anyone a quick start on projects with a short learning curve.

Q: What kind of microcontroller projects do you like to do in your spare time?
A: I have a couple. One is an autonomous UAV quad copter. Flying robots are much more exciting than ground based! I've also been playing with some LED cubes and started some designs for a SMT LED cube. And I'm designing a new Propeller board that looks cool and is packed with functionality for a fast way to get sensors up and running!

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