Web Site: www.parallax.com
Forums: forums.parallax.com
Sales: sales@parallax.com
Technical: support@parallax.com

Office: (916) 624-8333
Fax: (916) 624-8003
Sales: (888) 512-1024
Tech Support: (888) 997-8267

Board Of Education® - Serial (#28150) Rev C

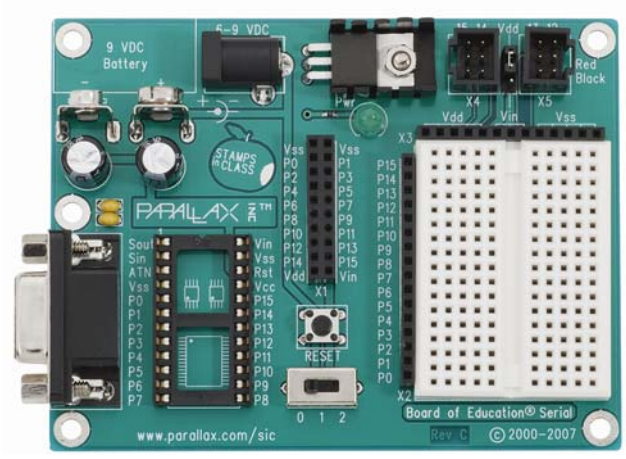
The Board Of Education (BOE) is a versatile, low-cost development platform designed for those interested in learning and using any of Parallax's 24-pin BASIC Stamp® microcontroller modules (not included). Its compact size, convenient features, and low price make it an ideal tool for the student and educator. For educators, the BOE provides a clean, efficient platform for our Stamps in Class Parts and Text Kits, or your own BASIC Stamp-based curriculum. This board is also available in a USB version, #28850. Note: The following applies to the Rev C board; see page 5 for notes on earlier revisions.

Features

- Accepts all 24-pin BASIC Stamp modules
- BASIC Stamp I/O pins plus power connections brought adjacent to a 2" x 1 3/8" breadboard
- Three-position power switch allows BASIC Stamp programming without providing power to 3-pin servo headers—very handy for robotics
- Jumper for selecting servo supply voltage: regulated (Vdd = 5 V) or unregulated supply (Vin)
- 2.1 mm center-positive plug and 9-volt battery power supply connections, mechanically interlocked to prevent dual connection
- Serial (DB-9) connector for BASIC Stamp programming and serial communication during run-time
- On-board 5 V regulator delivers up to 1 amp of current for larger projects
- Female 2 x 10 header for optional AppMod devices
- Grounded 0.125 in (3.18 mm) corner mounting holes, at 3.7 x 2.75 in (9.5 x 7 cm) on centers

Key Specifications

- Power supply requirements: 6–9 VDC
- Communication: Serial (RS-232) via DB9
- Operating temp.: 32–158 °F (0–70 °C)
- Dimensions: 3.05 x 4 in (7.75 x 10.16 cm)



Packing List

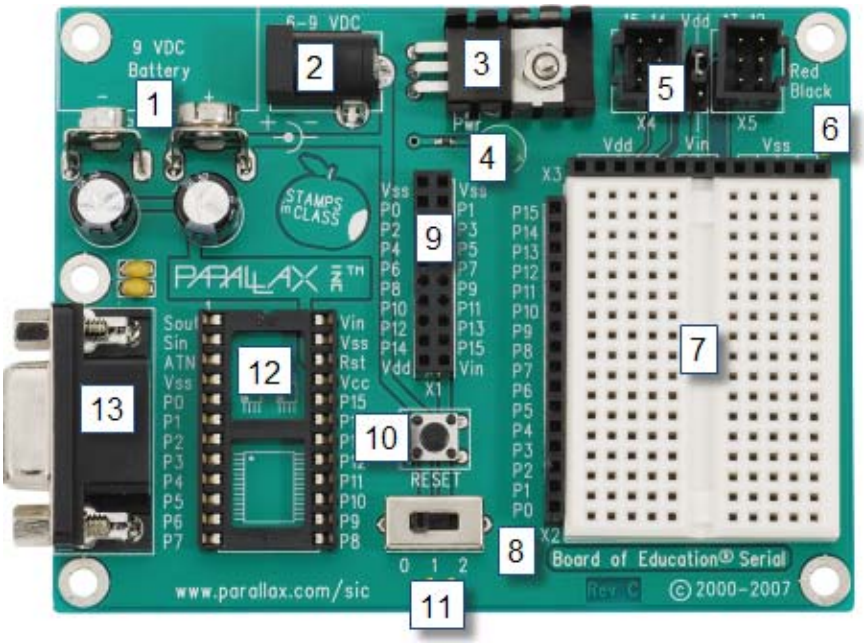
- Board of Education-Serial PCB
- 3-inch Jumper Wires - 1 bag of 10
- 4 rubber feet

Additional Items Required

- 24-pin BASIC Stamp module (see the Comparison Chart at www.parallax.com/basicstamp.)
- Serial cable (#800-00003) — OR — USB to Serial Adapter with USB A to Mini-B cable (#28031)
- 9 V battery — OR — a compatible 6–9 V power supply with a 2.1 mm center-positive plug. We recommend our 7.5 V, 1 amp supply (#750-00009).
- PC running Windows 2K/XP/Vista/7 for the BASIC Stamp Editor software (a free download from www.parallax.com/basicstampsoftware). (USB drivers for the optional adapter are included.)

Board of Education Serial Rev C Features

(See Notes for Earlier Board Revisions on page 5 if you have a Board of Education Serial Rev A or B.)



1. **9V Battery Clip:** You can use alkaline or rechargeable 9 volt batteries. The battery clip and barrel jack are intentionally positioned so you cannot use both at once.
2. **Barrel Jack:** This accepts a 2.1 mm center-positive barrel plug from a 6-9 V wall-mount supply or from a battery pack. You cannot use the barrel jack and a 9 volt battery at the same time.
3. **Voltage regulator:** Supplies regulated 5 V (up to 1 amp of current) for sockets and pins labeled Vdd. Vdd sockets are convenient for supplying 5 V to circuits you will build on the breadboard area.
4. **Power Indicator LED:** This LED will light up when power is supplied to your board and the power switch is in position 1 or 2.
5. **Servo headers (X4 and X5) and Power Select Jumper:** These each have two 3-pin connectors that bring power, ground, and I/O pin access together so you can easily plug in servos or other 3-pin devices. The power connection is pre-set to Vdd (+5 V) but you can set it to Vin (the board's supply voltage) by moving the shorting block on the jumper between the headers. Each 3-pin row is labeled with an I/O pin number above it. The 12, 13, 14, and 15 signal lines for the servo headers are also accessible as P12, P13, P14, and P15 I/O pin sockets on the X1 and X2 headers. This can be useful for building a servo signal indicator light on the breadboard as you may do in some Stamps in Class activities. For independent projects, keep these shared connections in mind, especially to avoid inadvertently connecting circuits with conflicting functions to the same I/O pin.
6. **Power header (X3):** The sockets labeled Vdd connect to +5 VDC, Vin connects directly to the power supplied to the board by the battery clip or barrel jack, and Vss connects to 0 V (ground).
7. **Breadboard:** The breadboard has metal clips that run underneath the white plastic board in a horizontal fashion. Each strip connects a 5-socket group, with two groups to each row, separated by a center trench. Wires or legs of components plugged into the same 5-socket group will be electrically connected. Components with many legs (such as pushbuttons or ICs), are placed in the middle of the board so that half of the legs are on the left side and half are on the right side of the trench. Note: Always disconnect power before building or modifying circuits!

8. **I/O Pin Access Header (X2):** The BASIC Stamp module's 16 I/O pins, labeled 0 to 15, are connected to this header. Its location adjacent to the breadboard makes it convenient for connecting circuits to I/O pins. Keep in mind that I/O pin access is also brought to the X4, X5, and X1 headers, so be careful not to build conflicting breadboard circuits if you are using these other headers as well.
9. **AppMod header (X1):** The AppMod header provides power, I/O pins, Vdd, Vin, and Vss access for any devices that are designed to use this 2x10 socket. Examples include the LCD Terminal AppMod (#29121), CMUcam (#30051), Easy Bluetooth Module (#30085), and Say It voice recognition module (#30080).
10. **Reset Button:** The reset button can be used to restart your BASIC Stamp without having to cycle the power. This saves wear-and-tear on the power switch for simple program restarts. Some advanced programming techniques use the reset button and the BASIC Stamp EEPROM program and data storage as a way to toggle between different program functions.
11. **3-Position Power Switch:** The leftmost position (0) is OFF – all power is disconnected. Always place the switch in this position when adding or changing components on the breadboard. The middle position (1) provides Vin (unregulated battery or power supply voltage) to the regulator, the BASIC Stamp socket, and to the connectors marked "Vin." This switch position also makes Vdd (5 volts) available to Vdd sockets on the breadboard and AppMod connectors. The rightmost position (2) also provides power to the servo connectors X4 and X5. Especially if your program causes a robot with servos connected to X4/X5 to start moving immediately, you can keep the 3-position switch in position (1) while loading the program, then switch to position (2) when you are ready for the robot to start moving.
12. **Socket for BASIC Stamp:** This socket is compatible with all 24-pin BASIC Stamp modules. It connects the BASIC Stamp to the programming connector, power, the power indicator LED, reset button, and all I/O pin headers.
13. **Serial Programming Connector:** This is a female DB9 socket for programming and for two-way serial communication between the BASIC Stamp and your computer. You can connect directly to a serial port on your computer, or use a USB to Serial Adapter to connect to a USB port.

Resources and Downloads

- BASIC Stamp Editor programming software (free), which contains the Getting Started tutorial, *BASIC Stamp Syntax and Reference Manual*, and *What's a Microcontroller?* text: www.parallax.com/basicstampsoftware
- Information about the BASIC Stamp family of microcontroller modules, including a comparison chart: www.parallax.com/basicstamp
- A list of compatible wall-mount power supplies for your Board of Education: www.parallax.com/go/powersupplies
- Free, moderated discussion forums: http://forums.parallax.com
- Free educational tutorials and mini-projects for BASIC Stamp 2 programming, and other resources for students and Educators: www.parallax.com/education; education@parallax.com.
- "How To-The Basics of Breadboarding" and other YouTube videos: www.parallax.com/go/videos
- Free Technical Support: support@parallax.com, or call toll-free in the Continental US: 888-99-STAMP, all others call 916-624-8333.

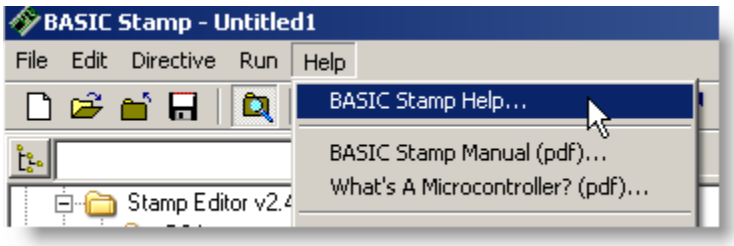
Quick-Start Guide



Step 1
Download and install the latest version of the free BASIC Stamp Editor software from:

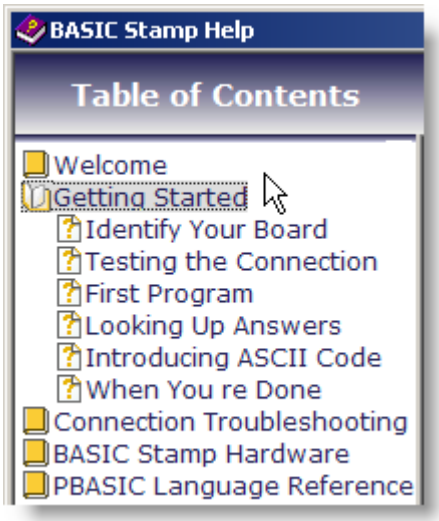
www.parallax.com/basicstampsoftware

...accepting all defaults. Note: Do not connect your hardware until you have followed the directions in Step 2 below.



Step 2

Open the BASIC Stamp Editor Software, and select BASIC Stamp Help from the Help menu.



Step 3

Click on the Getting Started link in the Help file, then follow the directions in the tutorial for identifying your board, inserting the BASIC Stamp module, and testing your programming connection.

Notes for Earlier Board Revisions

Board of Education - Serial Rev A Special Instructions

Servo Ports - There Are None!

The Board of Education Rev A does not have servo ports. However, 3-pin connections for servos and other devices can be built on the breadboard. For an example of connecting a standard servo to the Board of Education Rev A, see the instructions in the Servo Circuit Connections for Older Boards pdf at www.parallax.com/go/WAM. If you wish to supply a 3-pin device, such as a Parallax Continuous Rotation Servo, with a 6-volt power supply via a breadboard circuit, Parallax carries 4 AA cell battery holder with tinned leads (#753-00001) for this purpose.

3-Position Switch - There Isn't One!

To disable power on the Board of Education Rev A, you must disconnect the power supply or battery at its connector.

Board of Education - Serial Rev B Special Instructions

Servo Ports - There is no Servo Power Selection Jumper!

The Board of Education Rev B has servo headers (labeled X4 and X5), but it does not have a Servo Power Selection Jumper. On this board, the X4 and X5 headers are permanently connected to Vin. When connecting servos or other devices to the X4 and X5 headers, be sure to use a power supply that does not exceed the voltage tolerance of the servo or device. For example, the Parallax Continuous Rotation Servo requires a 6 V (maximum) supply, so it should not be plugged into the servo headers if using a 9 V battery or a 7.5 V or 9 V wall supply, or the life of the servo could be shortened. A 4 AA cell battery pack with a compatible barrel jack connector is available from Parallax (#700-00038).

3-Position Switch - There Isn't One!

To disable power on the Board of Education Rev B, you must disconnect the power supply or battery at its connector.

Vdd on AppMod Header - Limited Current Budget

Most of the connections labeled Vdd are supplied by the Board of Education Rev B's 5 V, 1 A voltage regulator. However, the socket labeled Vdd on the X1 AppMod header is instead supplied by the small voltage regulator on the BASIC Stamp module. The BASIC Stamp module's voltage regulator only has a 50 mA current budget for its processor, certain circuits built on the breadboard and connected to I/O pins, and any devices drawing current from its Vdd pin. The socket labeled Vdd on the X1 AppMod header draws current from the BASIC Stamp module's Vdd pin, so an AppMod or other device that draws current from this pin has to stay within the 50 mA current budget, which in many applications may turn out to be only a few milliamps. Before using an AppMod with the Board of Education Rev B, verify that it gets its power from the AppMod Header's Vin socket, and not Vdd.