Board Of Education® USB (#28850)

Development / Education Platform for the BASIC Stamp® and Javelin Stamp Microcontrollers

The Board Of Education USB (BOE-USB) is a complete, low-cost development platform designed for those interested in learning and using Parallax's 24-pin BASIC Stamp or Javelin Stamp modules. Its compact size, convenient features, and low price make it an ideal tool for the student and educator. For educators, the Board of Education provides a clean, efficient platform for our Stamps In Class Parts and Text Kits, or your own BASIC Stamp-based curriculum.

Features

- 2.1 mm center-positive plug and 9-volt battery power supply connections (mechanically interlocked to prevent dual connection). Note: The Board of Education USB is not powered from the USB connection.
- Three-position power switch allows BASIC Stamp IC programming without providing power to servo connectors.
- Jumper selection of servo power: regulated (Vdd) or unregulated (Vin).
- Mini USB connector for BASIC Stamp IC programming and serial communication during run-time.
- On-board regulator delivers up to 1 amp of power for larger projects.
- P0 - P15 I/O pins, Vdd, Vin, and Vss connections brought adjacent to 2" x 1 3/8" breadboard area.
- Female 10-pin dual row connector for optional AppMods.

Packing List

- Board of Education USB
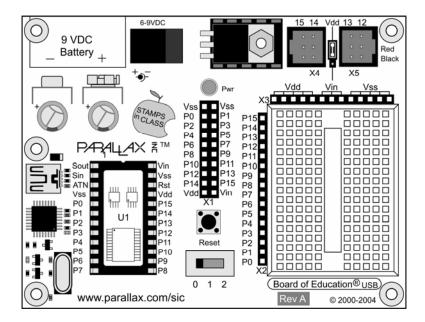- 3" jumper wires - pack of 10
- PCB rubber feet

Note: the necessary FTDI VCP drivers may be downloaded from www.parallax.com; see the Software and Hardware Installation section on page 3.

Mechanical Dimensions

- PCB: 4.00" x 3.05" (102 mm x 77 mm)
- Mounting Holes 3.75" x 2.75" (95 mm x 70 mm)

> ⚠ **Please read this entire document before using your Board of Education USB. If you need assistance, please contact Parallax Tech Support by phone or email using the contact information given at the top of this page.**

Power Supply Clip and Barrel Jack (top left): The 9 V battery clip and the barrel jack are positioned so that they cannot be accidentally used at the same time. For the jack we recommend our 9 VDC V 300 mA supply, # 750-00008.

Power Switch (bottom center): The leftmost position (0) is OFF – all power is disconnected. Always place the switch in position-0 when changing components on the breadboard, and when disconnecting or reconnecting to the PC. The middle position (1) provides Vin to the regulator, the BASIC Stamp IC socket, and to the connectors marked Vin. In this position, Vdd will also be available on the breadboard and AppMod (see below) connectors. The rightmost position (2) provides power to the servo connectors X4 and X5 (see servo power selection below). The three-position position power switch is convenient when using the BOE-USB on small robots, like the Parallax Boe-Bot®. Use position 1 to edit and test code while power is removed from the servos.

Servo Ports (X4 and X5), and Power Selection (top right): Select the power provided to servo sockets X4 and X5 by the jumper located between them; the default position is Vdd (+5 V regulated). When using a six-volt battery pack (as on a Boe-Bot robot), you may wish to move this jumper to the Vin position to provide extra power to the servos. When using Vin in the servo ports, always check to make sure the voltage supplied does not exceed the specifications of the particular brand of servos you are using. X4 and X5 connect to the BASIC Stamp I/O pins labeled above the sockets; do not build incompatible circuits connected to the same I/O pins on the breadboard when using X4 or X5. Always check the pinout and voltage requirements of 3-pin devices before connecting them to X4 or X5.

Reset Button: The reset button can be used to restart your BASIC Stamp IC without having to cycle the power. This saves wear-and-tear on the power switch for simple program restarts.

Breadboard Access for BASIC Stamp I/O (X2), Vdd, Vin, and Vss (X3): The BASIC Stamp IC's 16 I/O pins are brought to the X2 female socket left of the breadboard. I/O pins are accessed by plugging wires into the header, then into the breadboard sockets. The X3 socket provides four connection points for a +5V (Vdd) connection, unregulated input voltage (Vin), and ground (Vss).

AppMod Header (X1): provides connection and signal routing for 20-pin AppMods, the eb500 EmbeddedBlue Transceiver (#30068) and the LCD Terminal (#29121). All I/O pins, Vdd, Vin, and Vss are routed through the AppMod connector. The BASIC Stamp I/O pins used by a device in the AppMod Header should not also be used with conflicting circuits on the breadboard area. Please refer to the individual AppMod product documentation for device pin maps.

Software and Hardware Installation:

1. <u>Place the 4 rubber feet on the back of the board.</u> in the spaces provided near each corner, but do not cover the mounting holes. The feet will protect the back of the board from shorts and damage.
2. <u>Insert the BASIC Stamp module into the socket.</u> Be sure to orient it properly, matching the small and large chips on the module with the graphics on the board. Press down gently but firmly, being careful not to bend any pins under the board.
3. <u>Connect Power to your Board.</u> Place the 3-position switch to Off (position 0). Attach a 9V battery to the battery clip, or plug in a 6-9V 300 mA wall-mount supply. (If you will use your board with a 4-cell AA battery pack, you must use 1.5V alkaline batteries - 1.2V rechargeable batteries supply a total of 4.8 V - not enough voltage for this 5 V device.) Move the switch to position 1(power to board only) and verify that the power light comes on. Do not connect your board to your PC yet.
4. <u>Install the BASIC Stamp Editor Software</u> v2.2 or higher - it is available as a free download from http://www.parallax.com/downloads.
5. <u>Install the Virtual Com Port Drivers</u>.
   Browse to http://www.parallax.com, and click on the USB Drivers button on the home page. Follow the instructions on the Installing USB Drivers page.1

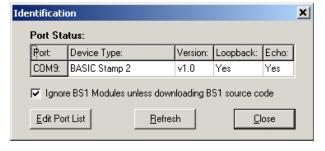   <u>Step 1</u>: Download the Parallax USB Driver Installer
   <u>Step 2</u>: Run the Installer, following the steps provided by the Wizard prompts.
   <u>Step 3</u>: Connect your Hardware.

Verifying your BASIC Stamp Programming Connection

In the BASIC Stamp Editor, from the toolbar menu select Run → Identify. The Identification Window will open, showing the status of the COM ports detected by the BASIC Stamp Editor. Communication is confirmed by a "Yes" in both the Loopback and Echo columns. However, when using USB-based communication such as with the BOE-USB, the Loopback column does not always give reliable results, and a "YES" in the Echo column is usually sufficient confirmation of communication, and the Loopback status can be ignored.

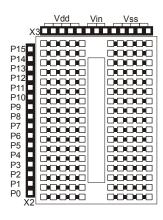## CAUTION: Connecting and Disconnecting your USB Board Safely

Your PC is communicating with the BASIC Stamp through a virtual COM port that will open and close each time you connect and disconnect your Board of Education USB. To avoid hanging up your operating system, take these precautions:

- Close the Debug Terminal before reprogramming, disconnecting, or reconnecting your board to the USB port. If you forget to do this, you may receive and error message and/or freeze the BASIC Stamp Editor when you next try to download a program. If this happens, close the BASIC Stamp Editor with the Task Manager (Ctrl+Alt+Delete). If you do this repeatedly, you may need to reboot your computer and/or reinstall the USB VCP drivers.
- If your BASIC Stamp is actively transmitting data via its port (using the DEBUG or SEROUT 16 commands) and you disconnect and reconnect your board, the BASIC Stamp Editor may misidentify it. To avoid this, turn off power to your board before reconnecting it to your PC.

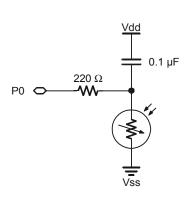## Using the Board of Education USB Breadboard

The breadboard has many strips of copper which run underneath the board These strips connect the sockets to each other horizontally, in groups of 5. This makes it easy to connect components together to build circuits.
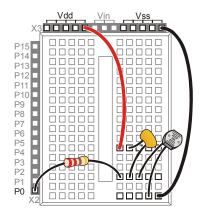
Each metal strip and its five sockets forms a node. A node is a point in a circuit where two components are connected. Connections between different components are formed by putting their legs in a common node. To use the breadboard, the legs of components or wires are placed in the sockets. The sockets are made so that they will hold the component in place. For chips with many legs (ICs), place them in the middle of the board so that half of the legs are on the left side and half are on the right side. Nodes on the left side are not connected to nodes on the right side.

Example Circuit

On the left is a simple circuit used to monitor light levels. The illustration on the right shows how this circuit can be constructed on the BOE-USB breadboard.

```
' Adapted from "What's a Microcontroller" v2.2" example program
' TestPhotoresistor.bs2 from www.parallax.com
' {$STAMP BS2}
' {$PBASIC 2.5}

time  VAR Word

DO
  HIGH 2
  PAUSE 100
  RCTIME 0, 1, time
  DEBUG HOME, "time =     ", DEC5 time
LOOP
```

Board Revisions and the Stamps in Class Series

All revisions of the Board of Education USB are functionally equivalent to the serial Board of Education Rev C. When using the BOE-USB with titles in the Stamps in Class series, follow the directions given for the Board of Education Rev C. Do not follow the directions given for the serial Board of Education Rev A or Rev B.