PARALLAX

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Board Of Education® - USB (#28850)

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. (Note: also available in a Serial version, #28150.)

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

- USB Mini-B connector to built-in USB to Serial circuit 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: USB A to Mini-B to PC

- 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-USB PCB

- 3-inch Jumper Wires - 1 bag of 10

- 4 rubber feet
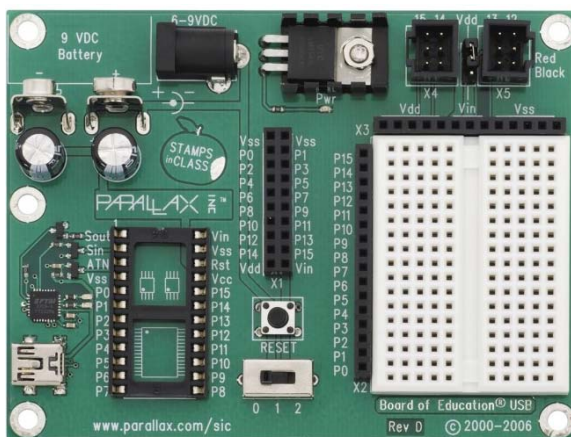
Additional Items Required

- 24-pin BASIC Stamp module (see the Comparison Chart at www.parallax.com/basicstamp.)

- USB A to Mini-B cable (#805-00006)

- 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 are included with the software installer.

Board of Education - USB Features
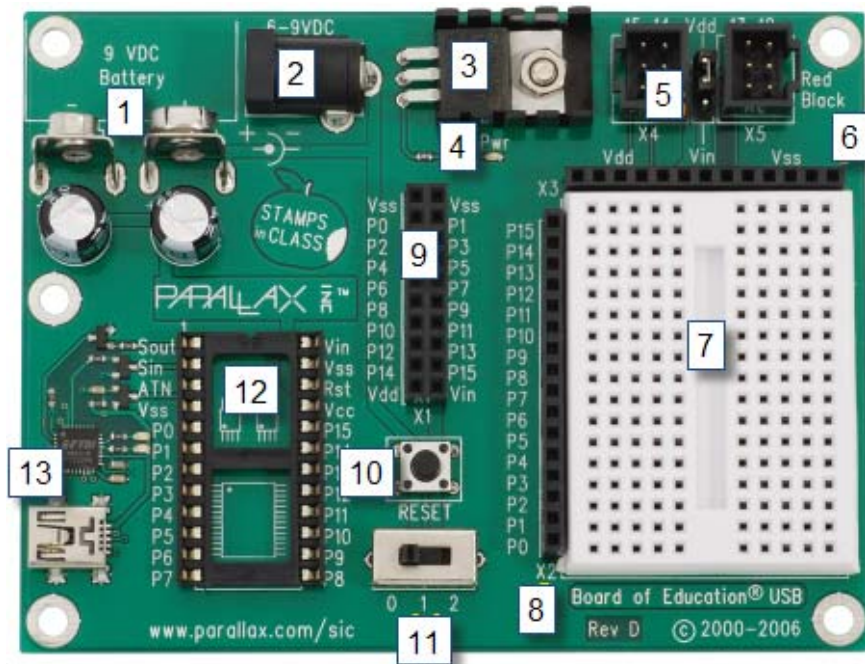
1. **9V Battery Clip:** You can use alkaline or rechargeable 9 volt batteries. The battery clip and barrel jack are intentionally positioned so you cannot use both at once.

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. **USB Programming Connector:** This is a USB Mini B socket and USB to serial (RS232) circuitry for programming and for two-way serial communication between the BASIC Stamp and your computer. The required USB drivers for Windows were included in the BASIC Stamp Editor Software installer; see the www.parallax.com/basicstampsoftware page for more information.

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:
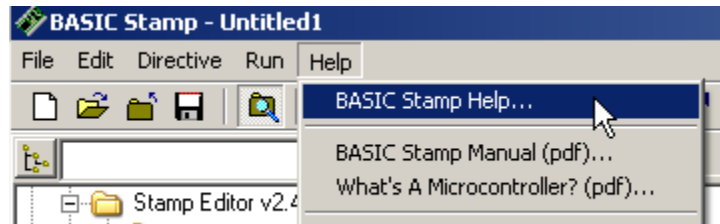
www.parallax.com/basicstampsoftware

...accepting all defaults. NOTE: Do not connect your hardware until you have installed the software. Necessary USB drivers are included in the software installer.
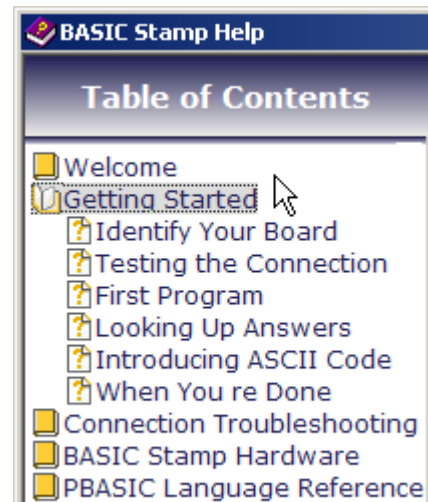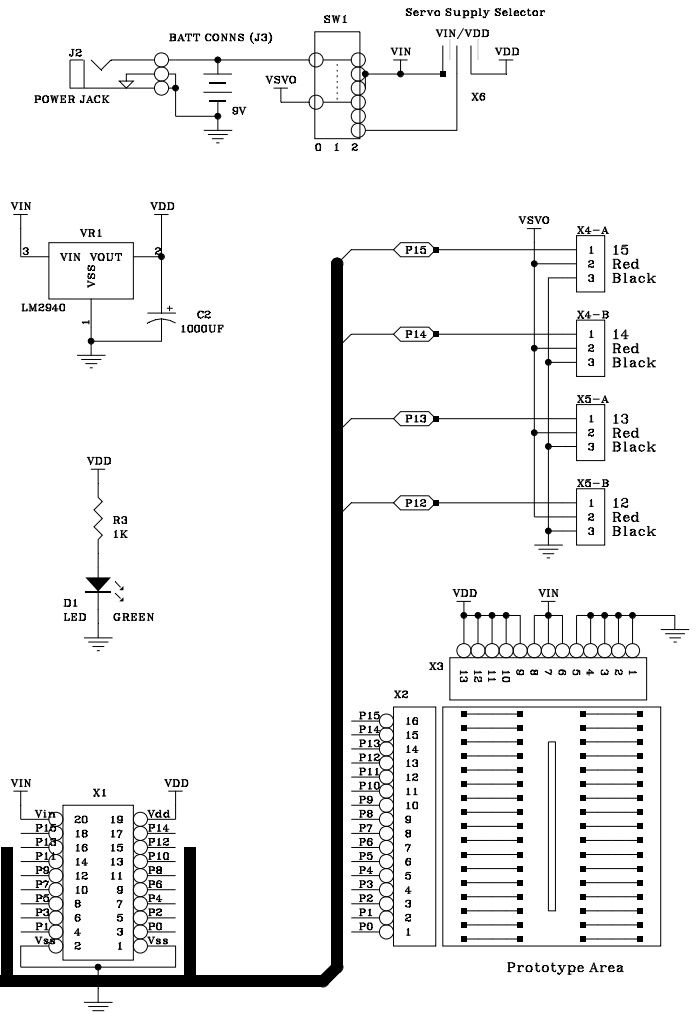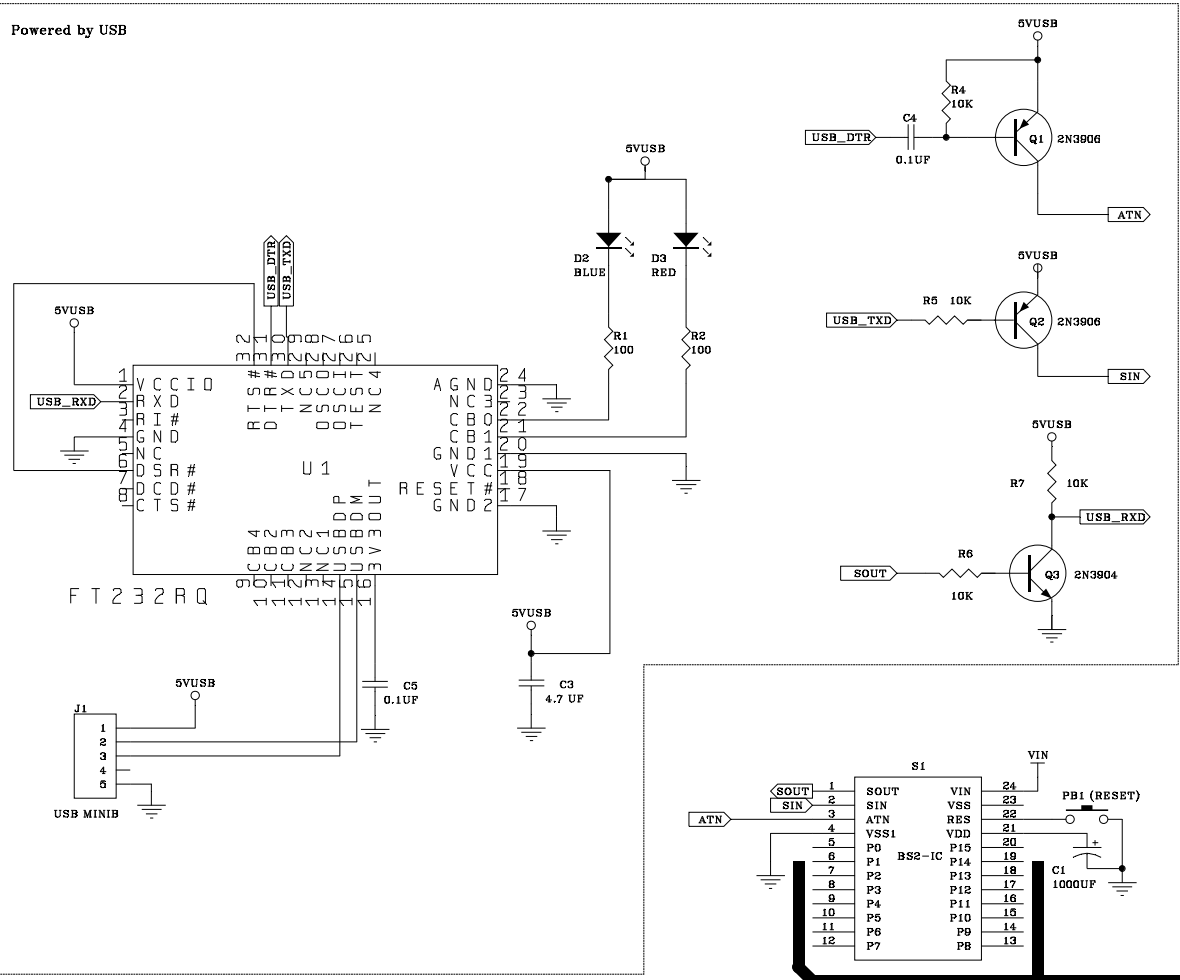
Step 2

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.

Powered by USB

5VUSB

R4
10K

C4
0.1UF

USB_DTR

Q1 2N3906

ATN

5VUSB

USB_TXD

R5 10K

Q2 2N3906

SIN

5VUSB

R7 10K

USB_RXD

SOUT

R6

Q3 2N3904

10K

5VUSB

D2
BLUE

D3
RED

R1
100

R2
100

5VUSB

USB_RXD

USB_DTR USB_TXD

VCCIO
RXD
RI#
GND
DSR#
DCD#
CTS#

U1

FT232RQ

AGND
NC
CBO
GND
VCC
RESET#
GND2

5VUSB

J1
1
2
3
4
5

USB MINIB

C5
0.1UF

C3
4.7 UF

5VUSB

SW1

J2

POWER JACK

BATT CONNS (J3)

9V

VSVO

0 1 2

VIN

VIN/VDD

VDD

X6

Servo Supply Selector

VIN

VR1

VIN VOUT

VSS

LM2940

VDD

C2
1000UF

VDD

R3
1K

D1
LED   GREEN

VSVO

P15

P14

P13

P12

X4-A
1
2   Red
3   Black

15

X4-B
1
2   Red
3   Black

14

X5-A
1
2   Red
3   Black

13

X5-B
1
2   Red
3   Black

12

VDD

VIN

X3

13 12 11 10 9 8 7 6 5 4 3 2 1

X2

P15 16
P14 15
P13 14
P12 13
P11 12
P10 11
P9   10
P8   9
P7   8
P6   7
P5   6
P4   5
P3   4
P2   3
P1   2
P0   1

Prototype Area

S1

SOUT
SIN
ATN
VSS1
P0
P1
P2
P3
P4
P5
P6
P7

BS2-IC

VIN
VSS
RES
VDD
P15
P14
P13
P12
P11
P10
P9
P8

24
23
22
21
20
19
18
17
16
15
14
13

1
2
3
4
5
6
7
8
9
10
11
12

SOUT
SIN

ATN

VIN

PB1 (RESET)

C1
1000UF

VIN

X1

Vin
P15
P13
P11
P7
P5
P3
P1
Vss

20
18
16
14
12
10
8
6
4
2

19
17
15
13
11
9
7
5
3
1

Vdd
P14
P12
P10
P8
P6
P4
P2
P0
Vss

VDD