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BASIC Stamp Syntax and Reference Manual

Version 2.2

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Web:	http://www.parallax.com
General e-mail:	info@parallax.com
Tech. e-mail:	support@parallax.com

Internet BASIC Stamp Discussion List

We maintain active web-based discussion forums for people interested in Parallax products. These lists are accessible from www.parallax.com via the Support → Discussion Forums menu. These are the forums that we operate from our web site:

- BASIC Stamps – This list is widely utilized by engineers, hobbyists and students who share their BASIC Stamp projects and ask questions.
- Stamps in Class® – Created for educators and students, subscribers discuss the use of the Stamps in Class curriculum in their courses. The list provides an opportunity for both students and educators to ask questions and get answers.
- Parallax Educators –Exclusively for educators and those who contribute to the development of Stamps in Class. Parallax created this group to obtain feedback on our curricula and to provide a forum for educators to develop and obtain Teacher's Guides.
- Translators – The purpose of this list is to provide a conduit between Parallax and those who translate our documentation to languages other than English. Parallax provides editable Word documents to our translating partners and attempts to time the translations to coordinate with our publications.
- Robotics – Designed exclusively for Parallax robots, this forum is intended to be an open dialogue for a robotics enthusiasts. Topics include assembly, source code, expansion, and manual updates. The Boe-Bot®, Toddler®, SumoBot®, HexCrawler and QuadCrawler robots are discussed here.
- SX Microcontrollers and SX-Key – Discussion of programming the SX microcontroller with Parallax assembly language SX – Key® tools and 3rd party BASIC and C compilers.
- Javelin Stamp – Discussion of application and design using the Javelin Stamp, a Parallax module that is programmed using a subset of Sun Microsystems' Java® programming language.

Supported Hardware, Firmware and Software

This manual is valid with the following software and firmware versions:

BASIC Stamp Model	Firmware	Windows Interface
BASIC Stamp 1	1.4	2.2
BASIC Stamp 2	1.0	2.2
BASIC Stamp 2e	1.1	2.2
BASIC Stamp 2sx	1.1	2.2
BASIC Stamp 2p	1.4	2.2
BASIC Stamp 2pe	1.1	2.2
BASIC Stamp 2px	1.0	2.2

The information herein will usually apply to newer versions but may not apply to older versions. New software can be obtained free on web site (www.parallax.com). If you have any questions about what you need to upgrade your product, please contact Parallax.

Credits

Authorship and Editorial Review Team: Jeff Martin, Jon Williams, Ken Gracey, Aristides Alvarez, and Stephanie Lindsay; Cover Art: Jen Jacobs; Technical Graphics, Rich Allred; with many thanks to everyone at Parallax Inc.

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Preface

Thank you for purchasing a Parallax BASIC Stamp® microcontroller module. We have done our best to produce several full-featured, easy to use development systems for BASIC Stamp microcontrollers. Depending on the Starter Kit you purchased, your BASIC Stamp model, development board and other contents will vary.

This manual is written for the latest available BASIC Stamp modules and software as of February 2005. As the product-line evolves, new information may become available. It is always recommended to visit the Parallax web site, www.parallax.com, for the latest information.

This manual is intended to be a complete reference manual to the architecture and command structure of the various BASIC Stamp models. This manual is not meant to teach BASIC programming or electrical design; though a person can learn a lot by paying close attention to the details in this book.

If you have never programmed in the BASIC language or are unfamiliar with electronics, it would be best to locate one or more of the books listed on the following page for assistance. All are available, either to order or to download, from www.parallax.com.

Books available in Adobe's PDF format are published for free download on the Parallax web site or on the CD-ROM which ships with our different Starter Kits. Books available in print may be purchased directly from Parallax or other distributors.

In addition, there are hundreds of great examples available on the Parallax CD and web site (www.parallax.com). Also, Nuts & Volts Magazine (www.nutsvolts.com / 1-800-783-4624) is a national electronic hobbyist's magazine that features monthly articles featuring BASIC Stamp applications. This is an excellent resource for beginners and experts alike!

Preface

Book	Part #	Author and Publisher	Availability	
			PDF	In Print
What's a Microcontroller?	28123	Andy Lindsay; Parallax Inc.; ISBN 1-928982-02-6	Yes	Yes
Robotics with the Boe-Bot	28125	Andy Lindsay; Parallax Inc.; ISBN 1-928982-03-4	Yes	Yes
IR Remote for the Boe-Bot	70016	Andy Lindsay; Parallax Inc.; ISBN 1-928982-31-X	Yes	Yes
Basic Analog and Digital	28129	Andy Lindsay; Parallax Inc.; ISBN 1-928982-04-2	Yes	Yes
Applied Sensors	28127	Tracy Allen, PhD.; Parallax Inc.; ISBN 1-928982-21-2	Yes	Yes
Understanding Signals	28119 (With Full Kit)	Doug Pientak; Parallax Inc.; ISBN 1-928982-23-9	Yes	Yes
Industrial Control	27341	Marty Hebel / Will Devenport; Parallax Inc.; ISBN 1-928982-08-5	Yes	Yes
Elements of Digital Logic	70008	John Barrowman; Parallax Inc.; ISBN 1-928982-20-4	Yes	Yes
The Microcontroller Application Cookbook Volumes 1 and 2	Vol. 1&2: 28113 Vol. 2: 28112	Matt Gilliland; Woodglen Press; ISBN 0-616-11552-7 and 0-972-01590-6	No	Yes
Al's "World Famous" Stamp Project of the Month Anthology	70013	Al Williams; Parallax Inc.; ISBN 1-928982-25-5	Portions	Yes
The Nuts and Volts of BASIC Stamps Volumes 1, 2, 3, 4, and 5	Vol. 4: 70010 Vol. 5: 70015	Jon Williams, Scott Edwards and Lon Glazner; Parallax, Inc.; ISBN 1-928982-10-7, 1-928982-11-5, 1-928982-17-4, 1-928982-24-7 and 1-928982-30-1	Yes (all)	Yes (Vol 4 and Vol 5)
StampWorks	27220	Jon Williams; Parallax, Inc.; ISBN 1-928982-07-7	Yes	Yes
Stamp 2 Communication and Control Projects	70004	Thomas Petruzzellis; McGraw-Hill; ISBN 0-071411-97-6	No	Yes
Programming and Customizing the BASIC Stamp Computer	27956	Scott Edwards; McGraw-Hill; ISBN 0-071371-92-3	No	Yes
BASIC Stamp 2p	70001	Claus Kuehnel and Klaus Zahnert; Parallax, Inc.; ISBN 1-928982-19-0	Yes	No

1: Introduction to the BASIC Stamp

Welcome to the wonderful world of BASIC Stamp® microntrollers. BASIC Stamp microcontrollers have been in use by engineers and hobbyists since we first introduced them in 1992. As of November 2004, Parallax customers have put well over three million BASIC Stamp modules into use. Over this 12-year period, the BASIC Stamp line of controllers has evolved into six models and many physical package types, explained below.

General Operation Theory

BASIC Stamp modules are microcontrollers (tiny computers) that are designed for use in a wide array of applications. Many projects that require an embedded system with some level of intelligence can use a BASIC Stamp module as the controller.

Each BASIC Stamp comes with a BASIC Interpreter chip, internal memory (RAM and EEPROM), a 5-volt regulator, a number of general-purpose I/O pins (TTL-level, 0-5 volts), and a set of built-in commands for math and I/O pin operations. BASIC Stamp modules are capable of running a few thousand instructions per second and are programmed with a simplified, but customized form of the BASIC programming language, called PBASIC.

PBASIC Language

We developed PBASIC specifically for the BASIC Stamp as a simple, easy to learn language that is also well suited for this architecture, and highly optimized for embedded control. It includes many of the instructions featured in other forms of BASIC (GOTO, FOR...NEXT, IF...THEN…ELSE) as well as some specialized instructions (SERIN, PWM, BUTTON, COUNT and DTMFOUT). This manual includes an extensive section devoted to each of the available instructions.

Hardware

At the time of this writing, there are currently seven models of the BASIC Stamp; the BS1, BS2, BS2e, BS2sx, BS2p, BS2pe, and the BS2px. The tables below are provided to easily compare their specifications, followed by diagrams that detail the various package types of these modules. Schematics for the SIP/DIP packages of all models can be found in Appendix D.

BASIC Stamp Model Comparison Table

Products	BS1	BS2	BS2e
Environment	0º - 70º C (32º - 158º F) **	0º - 70º C (32º - 158º F) **	0º - 70º C (32º - 158º F) **
Microcontroller	Microchip PIC16C56a	Microchip PIC16C57c	Ubicom SX28AC
Processor Speed	4 MHz	20 MHz	20 MHz
Program Execution Speed	~2,000 instructions/sec.	~4,000 instructions/sec	~4,000 instructions/sec
RAM Size	16 Bytes (2 I/O, 14 Variable)	32 Bytes (6 I/O, 26 Variable)	32 Bytes (6 I/O, 26 Variable)
Scratch PadRam	N/A	N/A	64 Bytes
EEPROM (Program) Size	256 Bytes, ~80 instructions	2K Bytes, ~500 instructions	8 x 2K Bytes, ~4,000 inst
Number of I/O Pins	8	16 + 2 Dedicated Serial	16 + 2 Dedicated Serial
Voltage Requirements	5 - 15 vdc	5 - 15 vdc	5 - 12 vdc
Current Draw@ 5 volts	1 mA Run, 25 µA Sleep	3 mA Run, 50 µA Sleep	25 mA Run, 200 µA Sleep
Source/Sink Current per I/O	20 mA / 25 mA	20 mA / 25 mA	30 mA / 30 mA
Source/Sink Current per unit	40 mA / 50 mA	40 mA / 50 mA per 8 I/O pins	60 mA / 60 mA per 8 I/O pins
PBASIC Commands*	32	42	45
PC Interface	Serial (w/BS1 Serial Adapter)	Serial (9600 baud)	Serial (9600 baud)
Windows Text Editor Version	Stampw.exe (v2.1 and up)	Stampw.exe (v1.04 and up)	Stampw.exe (v1.096 and up)

* PBASIC Command count totals include PBASIC 2.5 commands on all BS2 models.
** See below for industrial rated module information.

Industrial-Rated BASIC Stamp Modules

Some BASIC Stamp models come in Industrial-rated versions, with an environmental temperature tolerance range of -40°C to +85°C . Contact the Parallax Sales Team directly for the latest information regarding industrial-rated product availability and specifications.

BS2sx	BS2p24	BS2p40	BS2pe	BS2px
0º - 70º C (32º - 158º F) **	0º - 70º C (32º - 158º F) **	0º - 70º C (32º - 158º F) **	0º - 70º C (32º - 158º F) **	0º - 70º C (32º - 158º F) **
Ubicom SX28AC	Ubicom SX48AC	Ubicom SX48AC	Ubicom SX48AC	Ubicom SX48AC
50 MHz	20 MHz Turbo	20 MHz Turbo	8 MHz Turbo	32 MHz Turbo
~10,000 instructions/sec.	~12,000 instructions/sec.	~12,000 instructions/sec.	~6000 instructions/sec.	~19,000 instructions/sec.
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)	38 Bytes (12 I/O, 26 Variable)
64 Bytes	128 Bytes	128 Bytes	128 Bytes	128 Bytes
8 x 2K Bytes, ~4,000 inst.	8 x 2K Bytes, ~4,000 inst.	8 x 2K Bytes, ~4,000 inst.	16 x 2K Bytes (16 K for source)	8 x 2K Bytes, ~4,000 inst.
16 + 2 Dedicated Serial	16 + 2 Dedicated Serial	32 + 2 Dedicated Serial	16 + 2 Dedicated Serial	16 + 2 Dedicated Serial
5 - 12 vdc	5 - 12 vdc	5 - 12 vdc	5 - 12 vdc	5 - 12 vdc
60 mA Run, 500 µA Sleep	40 mA Run, 350 µA Sleep	40 mA Run, 350 µA Sleep	15 mA Run, 150 µA Sleep	55 mA Run, 450 µA Sleep
30 mA / 30 mA	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	60 mA / 60 mA per 8 I/O pins
45	61	61	61	63
Serial (9600 baud)	Serial (9600 baud)	Serial (9600 baud)	Serial (9600 baud)	Serial (19200 baud)
Stampw.exe (v1.091 and up)	Stampw.exe (v1.1 and up)	Stampw.exe (v1.1 and up)	Stampw.exe (v1.33 and up)	Stampw.exe (v2.2 and up)

Phone: (916) 624-8333
Toll free in the US or Canada: 1-888-512-1024
Email: sales@parallax.com

BASIC Stamp 1

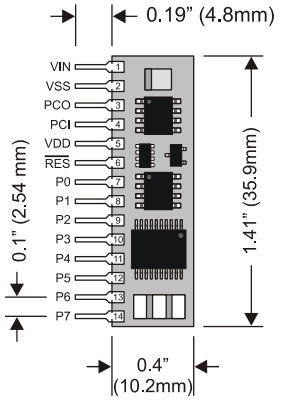

Figure 1.1: BASIC Stamp 1 (Rev B) (Stock# BS1-IC).

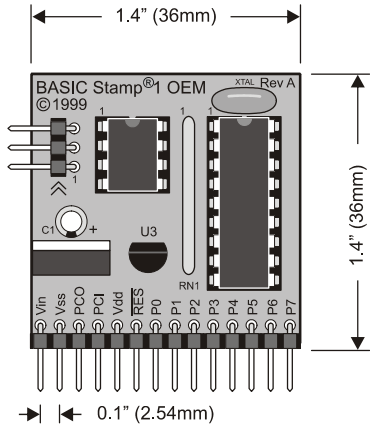

Figure 1.2: BASIC Stamp 1 OEM (Rev. A) (Stock# 27295).

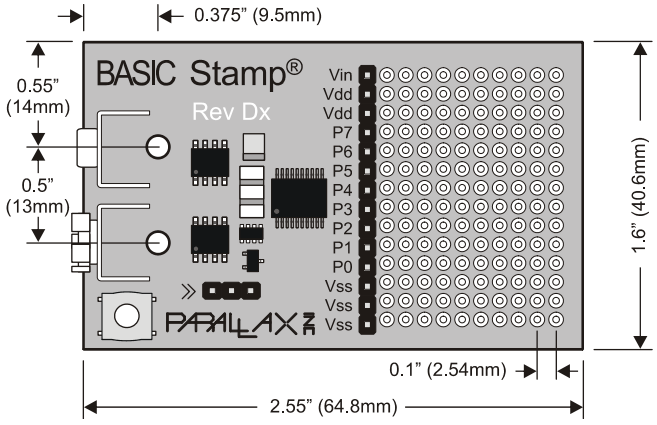

Figure 1.3: BASIC Stamp 1 (Rev Dx) (Stock# 27100).

The BASIC Stamp 1 is available several physical packages. The BS1-IC (Figure 1.1) uses surface mount components to fit in a small 14-pin SIP package. The preassembled BASIC Stamp 1 OEM (Figure 1.2) features an easier-to-trace layout meant to aid customers who wish to integrate the BASIC Stamp 1 circuit directly into their design (as a lower-cost solution). The BASIC Stamp 1 Rev. Dx (simply called the Rev. Dx), see Figure 1.3, includes a prototyping area suitable for soldering electronic components. These three packages are functionally equivalent, except that the Rev. Dx does not have an available reset pin.

In addition to the packages shown, there are prototyping boards available that feature a surface mounted BS1 and programming cable connector. Please check www.parallax.com → Products → Development Boards for product descriptions.

Pin	Name	Description
1	VIN	Unregulated power in: accepts 5.5 - 15 VDC (6-40 VDC on BS1-IC rev. b), which is then internally regulated to 5 volts. May be left unconnected if 5 volts is applied to the VDD (+5V) pin.
2	VSS	System ground: connects to BS1 Serial Adapter ground for programming.
3	PCO	PC Out: 4800 baud serial output (TTL level) to PC.
4	PCI	PC In: 4800 baud serial input (TTL level) from PC.
5	VDD	5-volt DC input/output: (Also called +5V) if an unregulated voltage is applied to the VIN pin, then this pin will output 5 volts. If no voltage is applied to the VIN pin, then a regulated voltage between 4.5V and 5.5V should be applied to this pin.
6	RES	Reset input/output: goes low when power supply is less than approximately 4.2 volts, causing the BASIC Stamp to reset. Can be driven low to force a reset. This pin is internally pulled high and may be left disconnected if not needed. Do not drive high.
7-14	P0-P7	General-purpose I/O pins: each can sink 25 mA and source 20 mA. However, the total of all pins should not exceed 50 mA (sink) and 40 mA (source).

Table 1.1: BASIC Stamp 1 Pin Descriptions.

See the "BASIC Stamp Programming Connections" section on page 27 for more information on the required programming connections between the PC and the BASIC Stamp.

BASIC Stamp 2

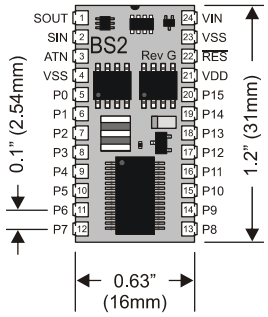

Figure 1.4: BASIC Stamp 2 (Rev. G) (Stock# BS2-IC).

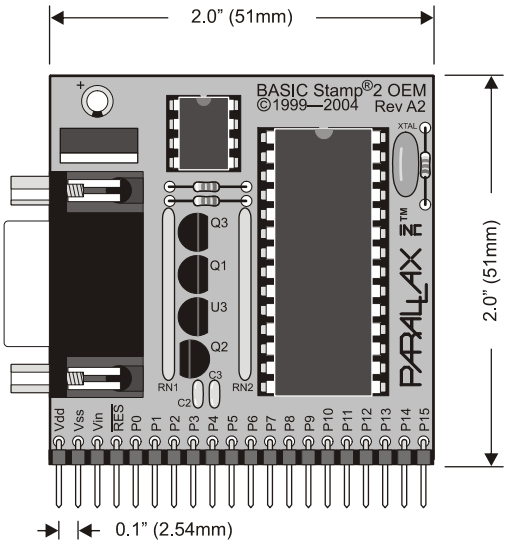

Figure 1.5: BASIC Stamp 2 OEM (Rev. A2) (Stock# 27290 assembled, or #27291 in kit form).

The BASIC Stamp 2 is available in several physical packages. The BS2-IC (Figure 1.4) uses surface mount components to fit in a small 24-pin DIP package. The BASIC Stamp 2 OEM (Figure 1.5) features an easier-to-trace layout meant to aid customers who wish to integrate the BASIC Stamp 2 circuit directly into their design (as a lower-cost solution). The BASIC

Stamp 2 OEM is available in either an assembled form or a kit form. These three packages are functionally equivalent.

In addition to the dual-inline and OEM packages, there are prototyping boards available that feature a surface mounted BS2. Please check www.parallax.com → Products → Development Boards for product descriptions.

Table 1.2: BASIC Stamp 2 Pin Descriptions.

Pin	Name	Description
1	SOUT	Serial Out: connects to PC serial port RX pin (DB9 pin 2 / DB25 pin 3) for programming.
2	SIN	Serial In: connects to PC serial port TX pin (DB9 pin 3 / DB25 pin 2) for programming.
3	ATN	Attention: connects to PC serial port DTR pin (DB9 pin 4 / DB25 pin 20) for programming.
4	VSS	System ground: (same as pin 23) connects to PC serial port GND pin (DB9 pin 5 / DB25 pin 7) for programming.
5-20	P0-P15	General-purpose I/O pins: each can sink 25 mA and source 20 mA. However, the total of all pins should not exceed 50 mA (sink) and 40 mA (source) if using the internal 5-volt regulator. The total per 8-pin groups (P0 – P7 or P8 – 15) should not exceed 50 mA (sink) and 40 mA (source) if using an external 5-volt regulator.
21	VDD	5-volt DC input/output: if an unregulated voltage is applied to the VIN pin, then this pin will output 5 volts. If no voltage is applied to the VIN pin, then a regulated voltage between 4.5V and 5.5V should be applied to this pin.
22	RES	Reset input/output: goes low when power supply is less than approximately 4.2 volts, causing the BASIC Stamp to reset. Can be driven low to force a reset. This pin is internally pulled high and may be left disconnected if not needed. Do not drive high.
23	VSS	System ground: (same as pin 4) connects to power supply's ground (GND) terminal.
24	VIN	Unregulated power in: accepts 5.5 - 15 VDC (6-40 VDC on BS2-IC Rev. e, f, and g), which is then internally regulated to 5 volts. Must be left unconnected if 5 volts is applied to the VDD (+5V) pin.

See the "BASIC Stamp Programming Connections" section on page 27 for more information on the required programming connections between the PC and the BASIC Stamp.

BASIC Stamp 2e

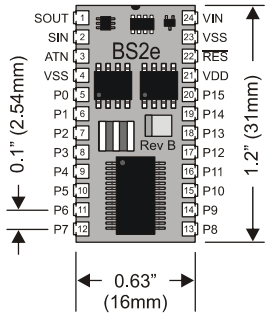

Figure 1.6: BASIC Stamp 2e (Rev. B) (Stock# BS2E-IC).

The BASIC Stamp 2e is available in the above 24-pin DIP package.

Table 1.3: BASIC Stamp 2e Pin Descriptions.

Pin	Name	Description
1	SOUT	Serial Out: connects to PC serial port RX pin (DB9 pin 2 / DB25 pin 3) for programming.
2	SIN	Serial In: connects to PC serial port TX pin (DB9 pin 3 / DB25 pin 2) for programming.
3	ATN	Attention: connects to PC serial port DTR pin (DB9 pin 4 / DB25 pin 20) for programming.
4	VSS	System ground: (same as pin 23) connects to PC serial port GND pin (DB9 pin 5 / DB25 pin 7) for programming.
5-20	P0-P15	General-purpose I/O pins: each can source and sink 30 mA. However, the total of all pins should not exceed 75 mA (source or sink) if using the internal 5-volt regulator. The total per 8-pin groups (P0 – P7 or P8 – 15) should not exceed 100 mA (source or sink) if using an external 5-volt regulator.
21	VDD	5-volt DC input/output: if an unregulated voltage is applied to the VIN pin, then this pin will output 5 volts. If no voltage is applied to the VIN pin, then a regulated voltage between 4.5V and 5.5V should be applied to this pin.
22	RES	Reset input/output: goes low when power supply is less than approximately 4.2 volts, causing the BASIC Stamp to reset. Can be driven low to force a reset. This pin is internally pulled high and may be left disconnected if not needed. Do not drive high.
23	VSS	System ground: (same as pin 4) connects to power supply's ground (GND) terminal.
24	VIN	Unregulated power in: accepts 5.5 - 12 VDC (7.5 recommended), which is then internally regulated to 5 volts. Must be left unconnected if 5 volts is applied to the VDD (+5V) pin.

See the "BASIC Stamp Programming Connections" section on page 27 for more information on the required programming connections between the PC and the BASIC Stamp.

BASIC Stamp 2sx

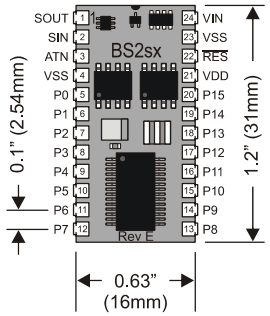

Figure 1.7: BASIC Stamp 2sx (Rev. E) (Stock# BS2sx-IC)

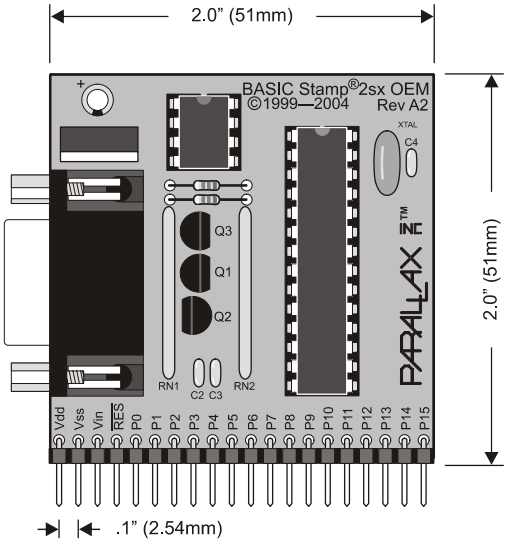

Figure 1.8: BASIC Stamp 2sx OEM (Rev. A2) (Stock# 27294)

The BASIC Stamp 2sx is available in the above two physical packages. The BS2sx-IC (Figure 1.7) uses surface mount components to fit in a small 24-pin DIP package. The preassembled BASIC Stamp 2sx OEM (Figure 1.8) features an easier-to-trace layout meant to aid customers who wish to integrate the BASIC Stamp 2sx circuit directly into their design (as a lower-cost solution). The BASIC Stamp 2sx OEM is available in assembled form only.

Pin	Name	Description
1	SOUT	Serial Out: connects to PC serial port RX pin (DB9 pin 2 / DB25 pin 3) for programming.
2	SIN	Serial In: connects to PC serial port TX pin (DB9 pin 3 / DB25 pin 2) for programming.
3	ATN	Attention: connects to PC serial port DTR pin (DB9 pin 4 / DB25 pin 20) for programming.
4	VSS	System ground: (same as pin 23) connects to PC serial port GND pin (DB9 pin 5 / DB25 pin 7) for programming.
5-20	P0-P15	General-purpose I/O pins: each can source and sink 30 mA. However, the total of all pins should not exceed 75 mA (source or sink) if using the internal 5-volt regulator. The total per 8-pin groups (P0 – P7 or P8 – 15) should not exceed 100 mA (source or sink) if using an external 5-volt regulator.
21	VDD	5-volt DC input/output: if an unregulated voltage is applied to the VIN pin, then this pin will output 5 volts. If no voltage is applied to the VIN pin, then a regulated voltage between 4.5V and 5.5V should be applied to this pin.
22	RES	Reset input/output: goes low when power supply is less than approximately 4.2 volts, causing the BASIC Stamp to reset. Can be driven low to force a reset. This pin is internally pulled high and may be left disconnected if not needed. Do not drive high.
23	VSS	System ground: (same as pin 4) connects to power supply's ground (GND) terminal.
24	VIN	Unregulated power in: accepts 5.5 - 12 VDC (7.5 recommended), which is then internally regulated to 5 volts. Must be left unconnected if 5 volts is applied to the VDD (+5V) pin.

Table 1.4: BASIC Stamp 2sx Pin Descriptions

See the "BASIC Stamp Programming Connections" section on page 27 for more information on the required programming connections between the PC and the BASIC Stamp.

BASIC Stamp 2p

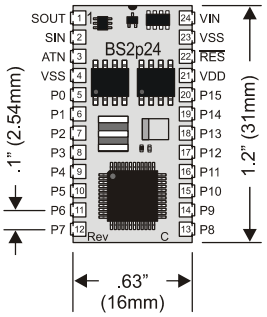

Figure 1.9: BASIC Stamp 2p24 (Rev. C) (Stock# BS2p24-IC)

This module is identical in function to the BS2p40-IC, except that it has 16 I/O pins.

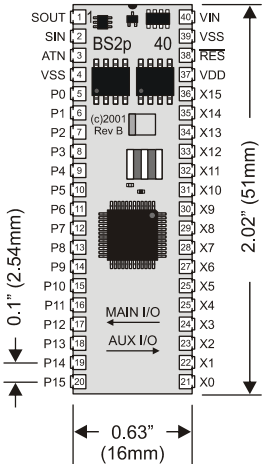

Figure 1.10: BASIC Stamp 2p40 (Rev. B) (Stock# BS2p40-IC)

This module is identical in function to the BS2p24-IC, except that it has 32 I/O pins.

The BASIC Stamp 2p is available in the above two physical packages. Both packages use surface mount components to fit in a small package. The BS2p24-IC (Figure 1.9) is a 24-pin DIP package. The BS2p40-IC (Figure 1.10) is a 40-pin DIP package. Both packages are functionally equivalent accept that the BS2p40 has 32 I/O pins instead of 16.

Pin	Name	Description
1	SOUT	Serial Out: connects to PC serial port RX pin (DB9 pin 2 / DB25 pin 3) for programming.
2	SIN	Serial In: connects to PC serial port TX pin (DB9 pin 3 / DB25 pin 2) for programming.
3	ATN	Attention: connects to PC serial port DTR pin (DB9 pin 4 / DB25 pin 20) for programming.
4	VSS	System ground: (same as pin 23 on BS2p24, or pin 39 on BS2p40) connects to PC serial port GND pin (DB9 pin 5 / DB25 pin 7) for programming.
5-20	P0-P15	General-purpose I/O pins: each can source and sink 30 mA. However, the total of all pins (including X0-X15, if using the BS2p40) should not exceed 75 mA (source or sink) if using the internal 5-volt regulator. The total per 8-pin groups (P0 – P7, P8 – 15, X0 – X7 or X8 – X15) should not exceed 100 mA (source or sink) if using an external 5-volt regulator.
{21-36}	X0-X15	(BS2p40 Only!) Auxiliary Bank of General-purpose I/O pins: each can source and sink 30 mA. However, the total of all pins (including P0 – P15) should not exceed 75 mA (source or sink) if using the internal 5-volt regulator. The total per 8-pin groups (P0 – P7, P8 – 15, X0 – X7 or X8 – X15) should not exceed 100 mA (source or sink) if using an external 5-volt regulator.
21 {37}	VDD	5-volt DC input/output: if an unregulated voltage is applied to the VIN pin, then this pin will output 5 volts. If no voltage is applied to the VIN pin, then a regulated voltage between 4.5V and 5.5V should be applied to this pin.
22 {38}	RES	Reset input/output: goes low when power supply is less than approximately 4.2 volts, causing the BASIC Stamp to reset. Can be driven low to force a reset. This pin is internally pulled high and may be left disconnected if not needed. Do not drive high.
23 {39}	VSS	System ground: (same as pin 4) connects to power supply's ground (GND) terminal.
24 {40}	VIN	Unregulated power in: accepts 5.5 - 12 VDC (7.5 recommended), which is then internally regulated to 5 volts. Must be left unconnected if 5 volts is applied to the VDD (+5V) pin.

Table 1.5: BASIC Stamp 2p Pin Connections

See the "BASIC Stamp Programming Connections" section on page 27 for more information on the required programming connections between the PC and the BASIC Stamp.

Basic Stamp 2pe

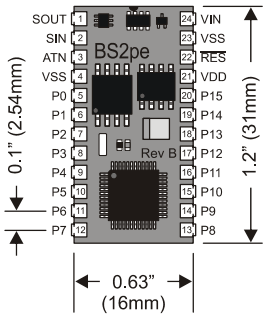

Figure 1.11: BASIC Stamp 2pe (Rev. B) (Stock# BS2pe-IC)

The BASIC Stamp 2pe is available in the above 24-pin DIP physical package.

Table 1.6: BASIC Stamp 2pe Pin Descriptions.

Pin	Name	Description
1	SOUT	Serial Out: connects to PC serial port RX pin (DB9 pin 2 / DB25 pin 3) for programming.
2	SIN	Serial In: connects to PC serial port TX pin (DB9 pin 3 / DB25 pin 2) for programming.
3	ATN	Attention: connects to PC serial port DTR pin (DB9 pin 4 / DB25 pin 20) for programming.
4	VSS	System ground: (same as pin 23), connects to PC serial port GND pin (DB9 pin 5 / DB25 pin 7) for programming.
5-20	P0-P15	General-purpose I/O pins: each can source and sink 30 mA. However, the total of all pins should not exceed 75 mA (source or sink) if using the internal 5-volt regulator. The total per 8-pin groups P0 – P7 or P8 – 15 should not exceed 100 mA (source or sink) if using an external 5-volt regulator.
21	VDD	5-volt DC input/output: if an unregulated voltage is applied to the VIN pin, then this pin will output 5 volts. If no voltage is applied to the VIN pin, then a regulated voltage between 4.5V and 5.5V should be applied to this pin.
22	RES	Reset input/output: goes low when power supply is less than approximately 4.2 volts, causing the BASIC Stamp to reset. Can be driven low to force a reset. This pin is internally pulled high and may be left disconnected if not needed. Do not drive high.
23	VSS	System ground: (same as pin 4) connects to power supply's ground (GND) terminal.
24	VIN	Unregulated power in: accepts 5.5 - 12 VDC (7.5 recommended), which is then internally regulated to 5 volts. Must be left unconnected if 5 volts is applied to the VDD (+5V) pin.