BSCB-1
BASIC STAMP CARRIER BOARD
Technical Manual

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BiPOM Electronics, Inc.

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WARRANTY:

1. Overview

BSCB-1 is a general purpose, low-cost and highly expandable micro-controller system. It is based on the Parallax, Inc. BASIC Stamp Microcontroller Modules (BS2).

For detailed information on BS2 Modules, please visit Parallax http://www.parallax.com/

"The BS2-IC is the single most popular BASIC Stamp module. Widely used in educational, hobby, and industrial applications. This module normally has 2K bytes of program space and 16 I/O pins. Serial PC interface provides enhanced debug features."

BSCB-1 has a 24-pin DIP socket for a BASIC Stamp BS2 Module, 14-pin single row and dual row connectors for standard alphanumeric LCD modules and an RS232 Serial Port. BSCB-1 should be powered from 6 to 12 Volts DC of external power source.

BSCB-1 is compatible with the following Parallax BS2 Modules:

BS2-IC; BS2e-IC; BS2sx-IC; BS2p-IC; BS2pe-IC

BSCB-1 does not include the BASIC Stamp module that is to be supplied by the user.

2. Specifications

BSCB-1 board has the following configuration:

- 24-pin DIP socket for a BS2 Module
- RS232 Serial Port connector for In-circuit Programming of the BS2 and for data communications.
- Single row and dual row 14-pin LCD connectors (with a contrast adjustment for LCD)
- 20-pin Expansion connector to a variety of peripheral boards (http://www.bipom.com/periph1.htm)
- Prototyping area to add custom circuitry
- Single operating unregulated voltage 6 … 12V
- On-board 5 Volt regulator
- Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters).
- Mounting holes of 0.125 inches (3.2 millimeters) are on four corners.
- 0° - 70° C operating, -40° - +85° C storage temperature range.
- 2-layer PCB, no vias for maximum reliability.

3. Software

Software examples for BSCB-1 and BiPOM Peripheral boards are available from the link below:

http://www.bipom.com/bscb.htm

4. Functional Blocks

Figure 1 shows the block diagram of the BSCB-1board

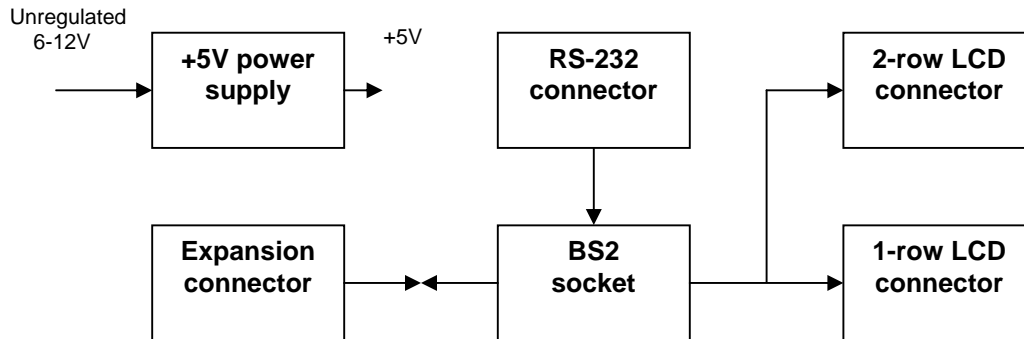Figure 1

BASIC Stamp Modules

Table 1 shows the main features of Parallax BASIC Stamp Modules that are compatible with BSCB-1

BS2 main features

Name:	BS2-IC	BS2e-IC	BS2sx-IC	BS2p-IC	BS2pe-IC
Microcontroller	Microchip PIC16C57	Scenix SX28AC	Scenix SX28AC	Scenix SX48AC	Ubicom SX48AC
Processor Speed	20 MHz	20 MHz	50 MHz	20 MHz	8MHz Turbo
Program Execution Speed (instructions/sec.)	4,000	4,000	10,000	12,000	6,000
PBASIC Commands	36	39	39	55	55
RAM Size (Total Bytes / In.Out / Variables)	32 / 6 / 26	32 / 6 / 26	32 / 6 / 26	38 / 12 / 26	38/12/26
EEPROM Program Size (Bytes / Basic instructions)	2K / ~500	8x2K/~4000	8x2K/~4000	8x2K/~4000	16x2K/~8000
Current Draw @ 5V (Run / Sleep)	8 mA/100µA	20mA/100µA	60mA/200µA	40mA/400µA	15mA/60uA
Source / Sink Current per I/O (mA)	20 / 25	30 / 30	30 / 30	30 / 30	30 / 30
Source / Sink Current per 8 I/O pins (mA)	40 / 50	60 / 60	60 / 60	60 / 60	60 / 60

Table 1

LCD Connectors

Alphanumeric LCD displays such as BiPOM's **LCD242** (http://www.bipom.com/periph1.htm)
or other alphanumeric LCD displays can be connected directly to BSCB-1.

Contrast for the LCD display can be adjusted using the trimmer R1.

Table 2. **LCD Connector (J5)**

Signal	Pin	Pin	Signal
P15	14	13	P14
P13	12	11	P12
not connected	10	9	Not connected
not connected	8	7	Not connected
P9	6	5	P10
P11	4	3	Vee
VCC (+5V)	2	1	GND

Table 3. **LCD Connector (J4)**

Name	Signal	Pin
P15	Data 3	14
P14	Data 2	13
P13	Data 1	12
P12	Data 0	11
-	Not connected	10 … 7
P9	Enable	6
P10	Write	5
P11	Register Select	4
Vee	Contrast control	3
VCC	+5V	2
GND	Ground	1

Asynchronous Serial Port

One asynchronous RS232 serial port is available on a 9-pin male D connector J1. RS232 port can be used for both BS2 In-circuit programming and data communications.

Table 4 shows the pin assignments for RS232 serial port connector.

Table 4. **Serial Port Connector (J1)**

Name	Signal	Pin
-	Not Connected	1
SOUT	Transmit Output (**TXD**)	2
SIN	Receive Input (**RXD**)	3
ATN	(**DTR**)	4
GND	GND	5
DSR	Connected with pin 7	6
RTS	Connected with pin 6	7
-	Not Connected	8
-	Not Connected	9

Input/Output expansion bus

16 Digital Input/Output lines and the +5 Volt power supply are available on the 20-pin expansion connector (J3) for interfacing to existing peripheral boards. Table 5 shows the pin assignments for the connector.

Expansion Connector (J3)

Signal	Pin	Pin	Signal
P8	20	19	P9
P10	18	17	P11
P12	16	15	P13
P14	14	13	P15
P7	12	11	P6
P5	10	9	P4
P3	8	7	P2
P1	6	5	P0
VCC (+5V)	4	3	GND
VCC (+5V)	2	1	GND

Table 5

Power Supply Unit

BSCB-1 board comes with a 6 Volts unregulated DC power supply. Other power supplies can also be used. External power supply should be able to supply 6 to 12 Volts DC at minimum 200mA current (more if peripheral boards will be used). The inner pin of the supply connector is positive and the outer ring is negative.

WARNING: Correct polarity should be observed when applying external DC supply to Power connector.

BSCB-1 has an on-board 5 Volt regulator LM2937 (IC1).

CAUTION: Depending on the current requirements of the any external circuitry such as peripheral boards that are attached to BSCB-1 and the level of input voltage applied, the power regulator IC1 may dissipate enough heat to cause skin injury upon touch. Contact with this regulator should be avoided at all times, even after the power to circuit has been switched off

5. Peripherals

BSCB-1 can be connected to a wide variety of low-cost peripheral boards to enhance its functionality. Some possibilities are:

- Prototyping board (PROTO-1)
- Training Board (TB-1)
- 4-digit 7-segment LED display board
- 12-bit Analog-To-Digital Converter Board
- Digital Input/Output Expander Board
- Real time clock + 128 MB flash card board
- Terminal board
- Reed relay board with 4 relays
- Power relay board with 2 relay
- Stepper motor driver board

Peripheral boards can either be stacked on top of BSCB-1 using stand-offs or connected in a chain configuration using flat ribbon cable. Figure 2 shows how BSCB-1 can be connected to a peripheral board in a stacked fashion. Figure 3 shows chain connection.
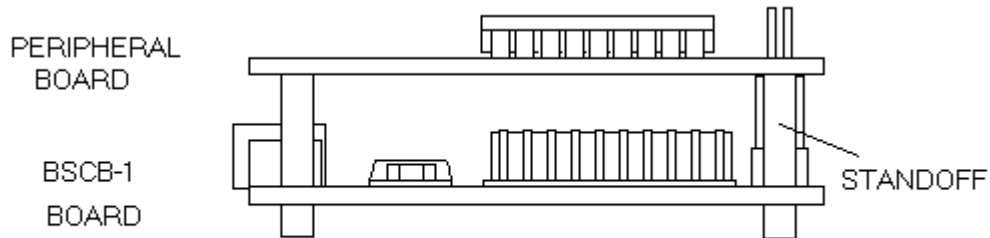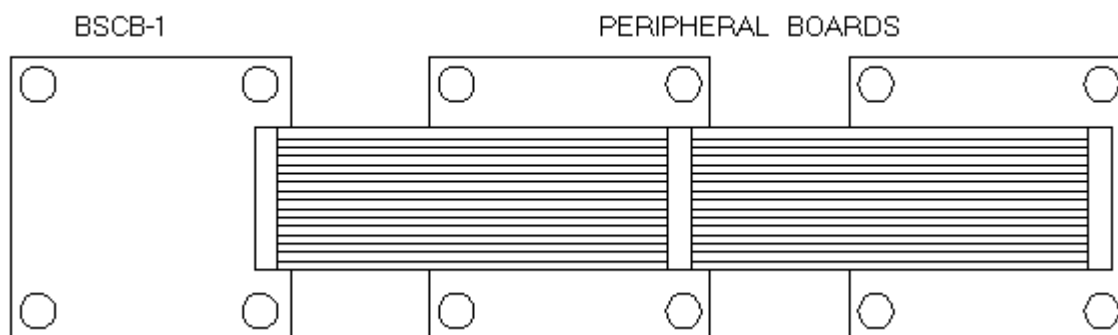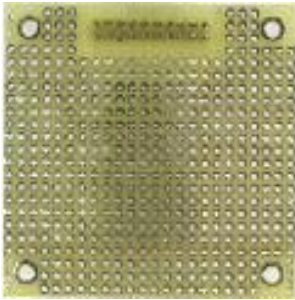

Figure 2

Figure 3

PROTO-1 Board

PROTO-1 provides prototyping area to add custom circuitry to BSCB-1. PROTO-1 can either be stacked with BSCB-1 using standoffs or connected to BSCB-1 as a separate board using ribbon cable (EXPCABLE-6 or EXPCABLE-18). The latter method is useful for mounting behind the panel of an instrument enclosure, for example, as a detachable display board.

LED-1 Board

A peripheral board with four 7-segment LED displays with decimal point. The displays are placed on sockets and can be easily replaced. 4-digit LED-driver with I2C-Bus interface is installed to this board. The segment outputs of LED-driver are controllable current-sink sources. They are switched on by the corresponding data bits and their current is adjusted by control bits. LED-driver on the board is controlled via an I2C-compatible 2-wire serial bus.

TB-1 Training Board

TB-1 Training Board allows performing various experiments with the BSCB-1 board. TB-1 has programmable traffic lights, 4-channel, 8-bit analog inputs, buzzer, switch inputs, and counter/timer inputs to test the interrupts.

DIO-1 Board

DIO-1 is an expander board with 8 open/collector outputs (each capable of 400mA) and 12 TTL/CMOS inputs/outputs. A PIC16C62 micro-controller on this board acts as an I2C 2-wire slave device to control inputs and outputs. DIO-1 can also be used as a standalone PIC micro-controller board

RTC board

Real Time Clock board with DS1307 Real-Time Clock from Dallas Semiconductor. The DS1307 is a battery-backed, low power, full-BCD clock/calendar with 56 bytes of nonvolatile static RAM. Address and data are transferred serially via I2C 2-wire bus. The clock/calendar provides seconds, minutes, hours, day, date, month and year information. RTC board has a 3Volt standard lithium battery which allows clock/calendar to operate in the absence of external power.

MMC/RTC board

MMC/RTC board is a storage flash device which is designed specifically for storage/data logger applications. MMC/RTC board has built-in Multi Media Card (MMC) socket. A Multi Media Card with high capacities such as 128 Megabytes can be installed on this board. MMC/RTC board also includes a DS1307 Real-Time Clock (RTC) from Dallas Semiconductor. The DS1307 has a battery-backed, low power full-BCD clock/calendar with 56 bytes of nonvolatile static RAM.
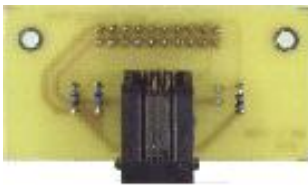
Terminal-1

Brings out ports 1 and 3 on the BSCB-1 to terminal blocks for easier access.

DAQ-2543 Board

DAQ-2543 is Analog-To-Digital / Digital-To-Analog peripheral board with TLC2543, 11-channel, 12-bit Analog-To-Digital Converter from Texas Instruments. All the channels are available on terminal blocks
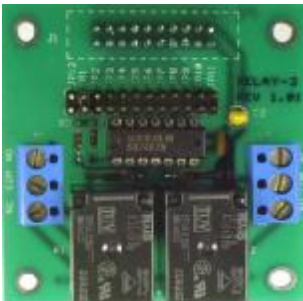
X10-1

Connects BSCB-1 to standard X10 devices through the TW523 Power line interface

MOTOR-1

Peripheral board to drive unipolar stepper motors. Provides up to 1.5A, 35V outputs. HALF-STEP and ONE-PHASE jumpers will determine the drive format (one-phase, two-phase or half-step).

RELAY-1 and RELAY-2

Relay peripheral board with 1 or 2 power relay respectively. Normally Open and Normally Closed Contacts

RELAY-4REED

Relay peripheral board with 4 reed relays. Normally Open Contacts.

6. Board Layout

Figure 4 shows positions of major components, connectors and terminals on the BSCB-1 board.

Figure 4.

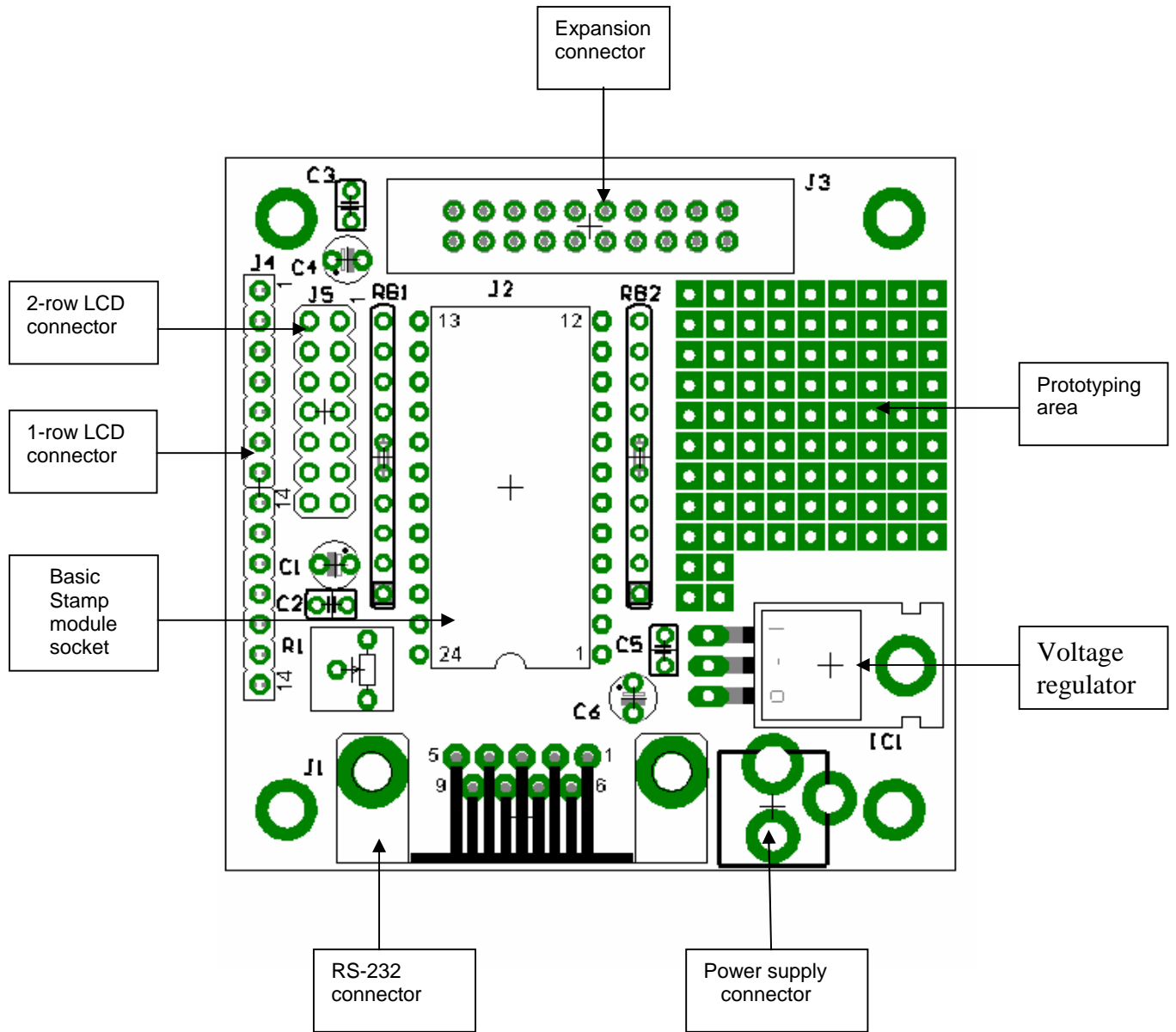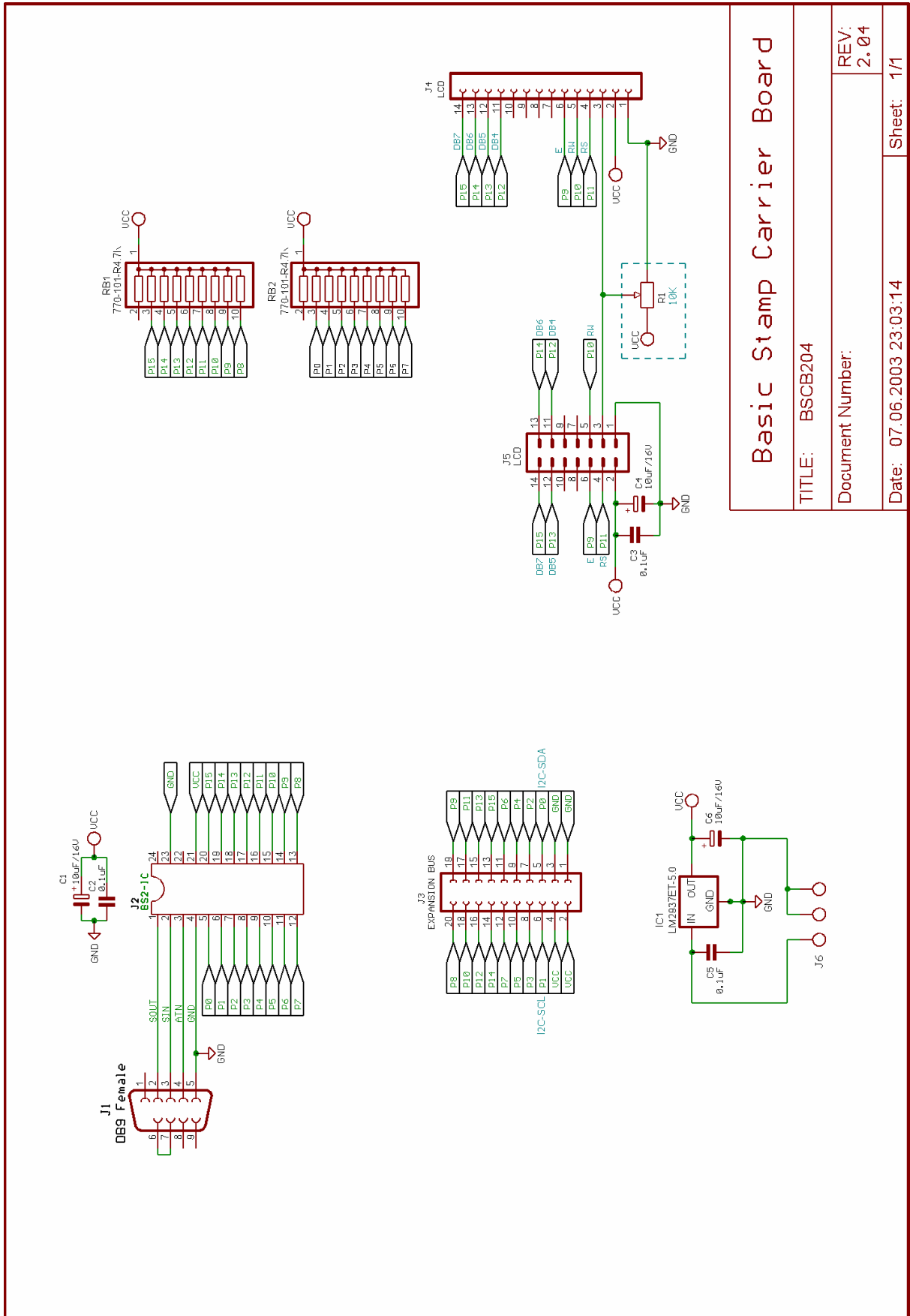# 7. Schematics.

Basic Stamp Carrier Board

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