

ME 1030 Name: _____ Due date: _____
Introduction to Mechanical Engineering

BOE BOT Collected Assignment #1

Communicating with the BOE-BOT

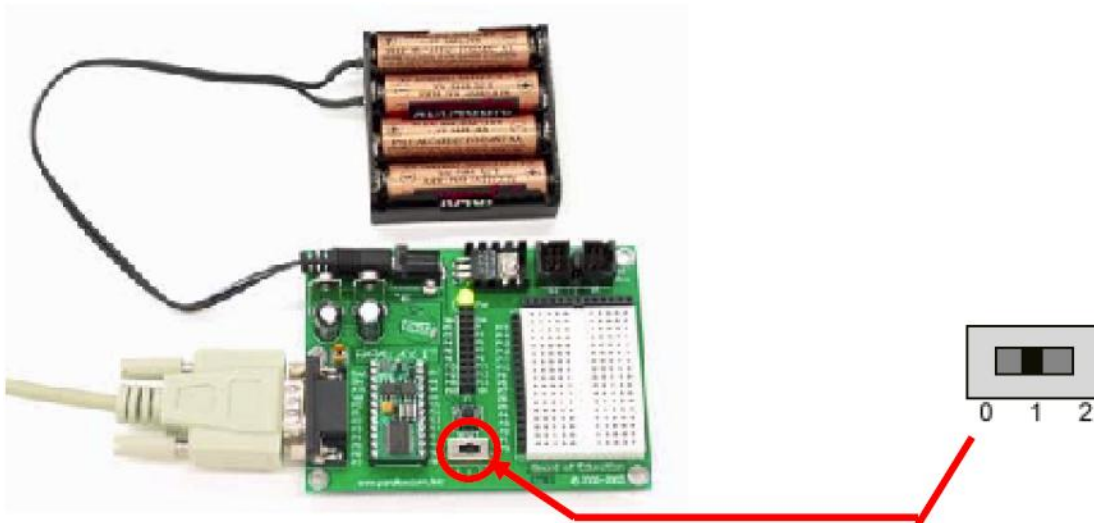
Reading Assignment:

1. Refer to the following sections in the BOE BOT Textbook (Version 3.0 for Fall 2012)
 - **Chapter 1, ACTIVITY #1: GETTING THE SOFTWARE**
 - **Chapter 2, ACTIVITY #1: BUILDING AND TESTING THE LED CIRCUIT**
 - **Chapter 2, ACTIVITY 2 – TRACKING TIME AND REPEATING ACTIONS WITH A CIRCUIT**
 - **Chapter 2, ACTIVITY #3: CONNECTING THE SERVO MOTORS**
2. Refer to various sections of BASIC Stamp Syntax and Reference Manual, Version 2.5 for information of PBASIC commands (download from www.parallax.com)
3. Lecture #1 – The BOE-BOT

Assignment:

1. *Setting Up the Hardware and Testing the System*

- Use your own BOE.
- *Use care when handling the BOE-BOT!*
- Connect the serial cable (or USB connection) from the computer to the BOE-BOT.
- Connect the battery pack to the BOE-BOT (be sure to disconnect this at the end of the class.)
- Turn the BOE on (move the slide switch to position 1 or 2).



- Launch the BASIC Stamp Editor.
- Select **Run – Identify** from the main menu in the BASIC Stamp Editor. A window like the one shown below should indicate that a BASIC Stamp 2 was found on COM1 on your computer. Check with the instructor if this does not work properly.

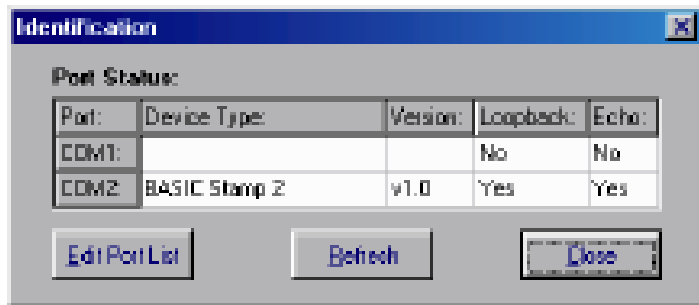


Figure 1-33
Identification
Window

Example: BASIC Stamp 2 found on COM2.

2. Your First Program

A. Program 2A – Sending a message from the BOE-BOT to the computer screen

- Launch the BASIC Stamp Editor.
- Insert directives in your program:
 - Specifying a **BASIC 2 Stamp**
 - Specifying **PBASIC 2.5** as the programming language
 - Specifying **COM1** as the communications port [**or whatever port works for you!**]
- Write a **program similar to the one shown on p. 21 of Robotics, Version 3.0 (shown below) except make the following changes:**

```
' Robotics with the Boe-Bot - HelloBoeBot.bs2
' BASIC Stamp sends a text message to your PC/laptop.

' {$STAMP BS2}
' {$PBASIC 2.5}

DEBUG "Hello, this is a message from your Boe-Bot."

END
```

- Include comments specifying:
 - course number (ME 1030)
 - the program number (Program 2A, etc)
 - the filename (pick an appropriate filename).
 - Change the greeting to “**Hello YOUR NAME, this is a message from your BOE-BOT**”.
 - Run the program and verify that it works properly.
 - Demonstrate proper operation of the program to the instructor.
- **Save and print the program.**
- **Print the output of the program from the DEBUG screen.**

B. Program 2B – Sending the result of a calculation from the BOE-BOT to the computer screen

- Make additions to Program 2A above like those on p. 21 of Robotics, Version 3 (shown below)
- Run the program and verify that it works properly.
- Demonstrate proper operation of the program to the instructor.
- **Save and print the program.**
- **Print the output of the program.**

```
' Robotics with the Boe-Bot - HelloBoeBotYourTurn.bs2
' BASIC Stamp does simple math, and sends the results
' to the Debug Terminal.

' {$STAMP BS2}
' {$PBASIC 2.5}

DEBUG "Hello, this is a message from your Boe-Bot."
DEBUG CR, "What's 7 X 11?"
DEBUG CR, "The answer is: "
DEBUG DEC 7 * 11

END
```

3. Tracking Time and Repeating Actions With a Circuit

A. Program 3A – Printing a message from the BOE-BOT once per second to the computer screen

- Write a **program similar to the one on p. 25 of YOUR TEXTBOOK** (shown below) except:
- Include initial comments as in previous programs.
- Add additional comments to explain different PBASIC commands that are used
- Modify the program so that it displays:
 - **Start timer ...**
 - **One second elapsed ...**
 - **Two seconds elapsed ...**
 - **.**
 - **.**
 - **Ten seconds elapsed ...**
 - **Done**
- Run the program and verify that it works properly.
- Demonstrate proper operation of the program to the instructor.
- **Save and print the program.**
- **Print the output of the program.**

```
' Robotics with the Boe-Bot - TimedMessages.bs2
' Show how the PAUSE command can be used to display messages at human speeds.

' {$STAMP BS2}
' {$PBASIC 2.5}

DEBUG "Start timer..."

PAUSE 1000
DEBUG CR, "One second elapsed..."

PAUSE 2000
DEBUG CR, "Three seconds elapsed..."

DEBUG CR, "Done."

END
```

B. Program 3B – Turning ON and OFF an LED

- Write a **program similar to the one on p. 32 of YOUR TEXTBOOK** (shown below) except:
- Include initial comments as in previous programs.
- Add additional comments to explain different PBASIC commands that are used
- Use the output pin corresponding to your group number.
- Run the program and verify that it works properly.
- Demonstrate proper operation of the program to the instructor.
- Save and print the program.

```
' Robotics with the Boe-Bot - HighLowLed.bs2
' Turn the LED connected to P13 on/off once every second.

' {$STAMP BS2}
' {$PBASIC 2.5}

DEBUG "The LED connected to Pin 13 is blinking!"

DO
  HIGH 13
  PAUSE 500
  LOW 13
  PAUSE 500
LOOP
```

C. Program 3C – Turning ON and OFF two LEDs (alternating)

- Write a **program like the second one on p. 35 of YOUR TEXTBOOK** (shown below) except:
- Include initial comments as in previous programs.
- Add additional comments to explain different PBASIC commands that are used
- Use the output pin corresponding to your group number and the next higher pin.
- Modify the program so that the first LED is on for two seconds while the second LED is off and then the second LED is on for two seconds while the first is off (i.e., the LED's alternate blinking indefinitely).
- Run the program and verify that it works properly.
- Demonstrate proper operation of the program to the instructor.
- Save and print the program.

```
DO
  HIGH 12
  HIGH 13
  PAUSE 500
  LOW 12
  LOW 13
  PAUSE 500
LOOP
```

D. Program 3D – Simulating a traffic light using red, yellow, and green LEDs

- Write a **program to control green, yellow, and red LEDs like a traffic signal**. The green light should come on for 10 seconds, followed by the yellow for 1 second, and then the red for 7 seconds. The program should loop indefinitely. [NOTE: If you cannot locate your green and yellow LEDs, you may use all red LEDs for this task.]
- Include initial comments as in previous programs.
- Add additional comments to explain different PBASIC commands that are used
- Use any three output pins.
- Run the program and verify that it works properly.
- Demonstrate proper operation of the program to the instructor.
- Save and print the program.

E. Program 3E – Turning ON and OFF an LED using the PULSOUT command

- Write a **program like the second one on p. 37 of YOUR TEXTBOOK** (shown below) except:
- Include initial comments as in previous programs.
- Add additional comments to explain different PBASIC commands that are used
- Use the output corresponding to your group number.
- The program should turn on the LED for 0.1 seconds and turn it off for 10 seconds. The program should loop indefinitely.
- Run the program and verify that it works properly.
- Demonstrate proper operation of the program to the instructor.
- Save and print the program.

```
' Robotics with the Boe-Bot - PulseP13Led.bs2
' Send a 0.13 second pulse to the LED circuit connected to P13 every 2 s.

' {$STAMP BS2}
' {$PBASIC 2.5}

DEBUG "Program Running!"

DO
  PULSOUT 13, 65000
  PAUSE 2000
LOOP
```

4. Report

Organize your results into a report and submit a single typed report for the activity to the instructor by the assigned due date. The report should consist of:

- A. A **coversheet as explained previously**. This time include the following Table on your coversheet! The Teaching Assistant and I will come around and inspect your programs during the lab sessions.

Demonstration of Programs

Program	Successfully Demonstrated
2A	
2B	
3A	
3B	
3C	
3D	
3E	

- B. Printouts for each of the programs (2A, 2B, 3A, 3B, 3C, 3D, and 3E).
- C. A list of the skills you learned.
- D. A list of problems and solutions.
- E. Your conclusions.