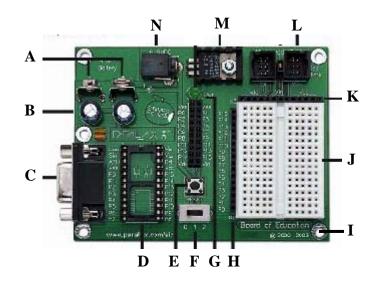
EGR 120 Introduction to Engineering File: N120H10M

Homework #10 BASIC Stamp & BOE-BOT Worksheet

The purpose of this assignment is to help the student become familiar with the BASIC Stamp microprocessor, the Board of Education, and the BOE-BOT robot. All of the answers for the assignment can be found using the following resources which are available at the websites listed below or on Paul Gordy's webpage at www.tcc.edu/faculty/webpages/Pgordy/EGR120/.

- Robotics with the BOE-BOT Student Guide, Version 2.2
 - o Available at http://www.parallax.com/dl/docs/books/edu/Roboticsv2_2.pdf
- BASIC Stamp Manual, Version 2.1
 - o available at http://www.parallax.com/dl/docs/prod/stamps/BasicStampMan.pdf
- BOEBOT lecture notes
- Parallax web site: <u>www.parallax.com</u>



Part A: (28 pts) Matching – Place the correct letter (A – N) next to each term below:

Term	Letter	Term	Letter
Serial Port		Power Jack for Adapter	
Power Indicator Light		Reset Button	
Breadboard		On/Off Switch	
9V Battery Clip		Header with Connections to P0 – P15	
5V Regulator		Header with Connections to Vss, Vdd, and Vin	
24-pin socket for BASIC Stamp		Filter Capacitors for 5V Regulator	
Connection Port for Servos		Mounting Hole	

Part B: (40 pts) Multiple Choice – Circle the letter corresponding to the best answer in each part.

- 1. Which of the following is NOT a model of the BASIC Stamp?
 - a) BASIC Stamp 2e b) BASIC Stamp 2 c) BASIC Stamp 2x d) BASIC Stamp 2p
 - e) BASIC Stamp 1

 2. The BASIC Stamp has how many input/output pins? a) 5 b) 10 c) 12 d) 16 e) 24
 3. The BASIC Stamp is mounted on a circuit board called: a) the Board of Education b) the breadboard c) the IC board d) the BASIC Stamp Circuit Board e) the proto-board
 4. The +5V connection on the BASIC Stamp is referred to as: a) Vdd b) Vin c) Vss d) Vout e) Vsupply
 5. The <i>ground</i> (or 0V) connection on the BASIC Stamp is referred to as: a) Vdd b) Vin c) Vss d) Vout e) Vsupply
 6. The BASIC Stamp is programmed using a programming language called: a) BASIC b) Quick BASIC c) Visual BASIC d) Microsoft BASIC e) PBASIC
 7. The BASIC Stamp 2 has how many total pins? a) 14 b) 16 c) 18 d) 24 e) 32
 8. The BASIC Stamp can be powered using: a) a 9V battery b) an adapter that can be plugged into a wall outlet c) a battery pack with four AA batteries d) all of the above e) none of the above
9. The BASIC Stamp is connected to the computer using:a) a serial cable b) a parallel cable c) a video cable d) an AC power cablee) none of the above
 10. Which of the following is not a valid position for the 3-position switch on the Board of Education? a) Power OFF b) Power OFF & Servo Ports ON c) Power ON & Servo Ports OFF d) Power ON & Servo Ports ON
11. The BASIC Stamp is made by which company?a) Intel b) AMD c) National Semiconductor d) Boebotics e) Parallax
12. The BOE-BOT turns its wheels by turning what type of devices?a) motorsb) stepper motorsc) servosd) relayse) gearhead motors
 13. Programs are written for the BASIC Stamp and downloaded to the BASIC Stamp using: a) Code Warrior b) Microsoft Visual BASIC c) BASIC Stamp Editor d) BASIC Stamp compiler e) BASIC Stamp Downloader
14. The space on the Board of Education for building circuits is the:a) integrated circuitb) breadboardc) connection portd) serial porte) regulator
 15. BASIC Stamp programs can be started by: a) moving the ON/OFF switch into position 2 c) pressing the reset button b) downloading the program d) all of the above

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16. Which of the followinga) infrared detectore) whisker	•		nperature probe d) se	rvo
17. BASIC Stamp program ' {\$STAMP BS2} ' {\$PBASIC 2.5} identifying the model of These statements are ca	of the BASIC Sta	mp to be used	and the version of the	
a) compiler directives	b) identifiers	c) tokens	d) instructions	e) commands
18. Comments in BASIC S a) / b) //	c) '	d) ''	e) *	
19. Text messages can be s	sent by a BASIC	Stamp program	n to the computer scree	en using which
command? a) PRINT b) C	COUT	c) LPRINT	d) DISPLAY	e) DEBUG
20. Some of the first simple programs using the BASIC Stamp involve using the BASIC Stamp to turn on and off small device that gives off light called a(an):				
a) bulb b) I	-	c) LCD	d) CRT	e) resistor
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Part C: (32 points) <u>True/False</u> – Circle T (True) or F (False) in each part below.

1. Т F Some servos only turn over a certain angular range (such as -90° to $+90^{\circ}$), but the servos in the BOE-BOT have been modified to turn continuously. 2. Т F The BOE-BOT turns by rotating one servo at a faster rate than the other servo. 3. Т F In order for the BOE-BOT to move forward, one servo needs to turn clockwise and the other needs to turn counter clockwise. 4. Т F The BASIC Stamp has 24 I/O pins. 5. Т F When the BASIC Stamp IC is plugged into an IC socket on the Board of Education, care needs to be taken to insure that it is not plugged in upside down. 6. Т F If a 9V battery is used on the Board of Education (BOE), the purpose of the *voltage regulator* on the BOE is to produce a steady 5V required by the BASIC Stamp. 7. Т F LED stands for *light emitting device*. 8. Т F Once a program is downloaded from the computer into the BASIC Stamp, the serial cable may be disconnected from the Board of Education. 9. Т F The BASIC Stamp command LOW 12 will set I/O pin P12 to ground (or 0V or Vss).

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10.	Т	F	The BASIC Stamp command <i>HI</i> 5 will set I/O pin P5 to 5V (or Vdd).			
11.	Т	F	The BASIC Stamp is referred to as a <i>microprocessor</i> or a <i>microcontroller</i> .			
12.	Т	F	The BASIC Stamp 2 runs at a speed of 20 MHz and can execute about 4000 instructions per second.			
13.	Т	F	In order to control the brightness of an LED, a <i>resistor</i> is connected in series with the LED.			
14.	Т	F	Programs may be restarted on the BOE-BOT by pressing the Reset button.			
15.	Т	F	The name <i>BASIC Stamp</i> comes from the fact that it is about the size of a postage stamp and it is programmed using a version of BASIC.			
16.	Т	F	The BOE-BOT can be steered by turning the ball that serves as its front wheel.			