



Programming Learning Activity: 1.6

“Variables and Subroutines”

SPIN language terms you need to know:

- **VAR** – short for “variable”. When declared in the VAR block, these variables are global which means that they can be called by other programs called “objects”
- **LONG**- a variable with a size of 32 bits
- **BYTE** – a variable with a size of 8 bits
- ‘ - an apostrophe used in front of text within SPIN code is considered programmer comments. The computer does not READ this information when scanning the code.

Type the code in figure 1 into the Propeller Spin Tool program:

```

VAR
Long LED_1, LED_2, LED_3      '3 variables of "LONG" size declared
Byte BUTTON_ON                'BUTTON_ON "Byte" sized variable declared

PUB Main                       'name of PUB method = "Main"
    BUTTON_ON := 10            'Variable BUTTON_ON declared as pin 10
    LED_1 := 24                'LED_1 declared as pin 24
    LED_2 := 23                'LED_2 declared as pin 23
    LED_3 := 22                'LED_3 declared as pin 22

    REPEAT
        Three_Lights_ON       'name of third PUB method in this program
        REPEAT UNTIL INA[BUTTON_ON] 'repeat until pin 10 button is pushed
        DIRA [LED_1..LED_3]~   'Variables LED_1 - LED_3 set as outputs
        OUTA [LED_1..LED_3]~   'Variables LED_1- LED_3 output condition cleared
        Blink                  'name of second PUB method in this program
        WAITCNT(CLKREQ/2 + CNT) 'pause for 1/2 second

```

Code continued on next page

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PUB Blink

```
DIRA [LED_1..LED_3]~~
```

```
REPEAT 4
```

```
    WAITCNT(CLKREQ/5 + CNT)
```

```
    OUTA [LED_1]~~
```

```
    WAITCNT(CLKREQ/5 + CNT)
```

```
    !OUTA [LED_1]
```

```
    OUTA [LED_2]~~
```

```
    WAITCNT(CLKREQ/5 + CNT)
```

```
    !OUTA [LED_2]
```

```
    OUTA [LED_3]~~
```

```
    WAITCNT(CLKREQ/5 + CNT)
```

```
    !OUTA [LED_3]
```

PUB Three_Lights_ON

```
DIRA [LED_1..LED_3]~~
```

```
OUTA [LED_1..LED_3]~~
```

```
WAITCNT(CLKREQ/50 + CNT)
```

Figure 1:

****Press the F10 key to load the code to the Propeller Chip or press F11 to load the code to EEPROM ****

1. This is a long program, but it will help us learn some new stuff. What happens when the code is downloaded through F10 or F11?
2. When the push-button connected to pin 10 is pushed, what happens?
3. To the right of the code in the VAR and PUB Main sections you will see COMMENTS that are made to help You, “the user”, understand what the code is doing. You will notice the use of the apostrophe just prior to the comments. This is a common way to help document what is happening in a program. The program does not see this information as code. Applying what you have learned so far, add comments to the program explaining what the instructions are doing in the PUB Blink and PUB Three_Lights_ON methods (subroutines).

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4. Many people who are trying to learn a new programming language study programs that they are given to get information that can help them write their own programs. Using the examples that are shown in this program, think up an ORIGINAL idea for a program that YOU want to write. Some examples might be making more lights flash using different PUB names and different flash times. Another idea might be to make multiple sets of LED's flash, based on separate push-button controls.
(YOUR PROGRAM DOESN'T HAVE TO BE SUPER LONG....JUST COMPLETE THE TASK!)
5. This is a chance to show your teacher how SMART you really are, so get started! In the space below, write down the IDEA for what you want the program to do. We will call this “identifying the problem”
6. After you write your “problem” write the program down that you think will solve the “problem” . We will call this the “prototype”.
7. Once you write the program, “TEST” your prototype. Does it work? Why or why not?
8. If it DOESN'T work, “re-design” or re-write in your case the program and try it again. When its RIGHT...present the solution to your teacher! Welcome to being an ENGINEER!

PROBLEM:

CREATE PROTOTYPE: (Write your code)

TEST: (Did it work?) if not, re-design and re-test!