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Embedded Systems – Assignment 4

Problem Description:
Use MPLAB X IDE and the PIC18F45K50's assembly language to open/close the switch of a solid-state relay and turn on an AC light bulb.

Pseudocode:

```
switch = 0;       // Used to open/close the solid-state relay.

while(true) {
        if (push button RB4 == pushed)
                switch = 1;       // Close the solid-state relay's switch.
        else
                switch = 0;       // Open the solid-state relay's switch.
}
```

Assembly Code:
Code from "ES_A4.asm"; included in .zip file.

```
#include <p18F45K50.inc>

    CONFIG WDTEN = OFF      ; Disable the watchdog timer.
    CONFIG MCLRE = ON       ; MCLEAR pin is on.
    CONFIG DEBUG = ON       ; Enable debug mode.
    CONFIG LVP = ON         ; Low-voltage programming is on.
    CONFIG PBADEN = OFF     ; RB[5:0] will be configured as digital inputs (datasheet, pg. 133)
    CONFIG FOSC = INTOSCIO  ; Internal oscillator (port function on RA6)

    ORG 0   ; Start code at 0.

Start:
    CLRF PORTA
    CLRF LATA
    CLRF TRISA  ; Use PORTA as output.
    CLRF PORTB
    CLRF LATB
    CLRF TRISB

    BSF TRISB, 4    ; RB4 (the push button) is being used as input now.

Main:
    ; If RB4 is 0 (clear), skip the next instruction.
    ; When RB4 is pressed, it sends a low (0) signal. When not pressed, it sends a high (1) signal.
    BTFSC PORTB, 4      ; BTFSC = "bit test file; skip if clear"
    GOTO Off            ; This GOTO will be reached when RB4 isn't being pushed.
    GOTO On             ; This GOTO will be reached when RB4 is being pushed.

Off:
    CLRF PORTA
    CLRF LATA
    GOTO Main

On:
    ; Use RA7 to close the SS relay's switch; allow AC current through the lightbulb.
    BSF PORTA, 7
    BSF LATA, 7
    GOTO Main
end
```

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Wiring Diagram: