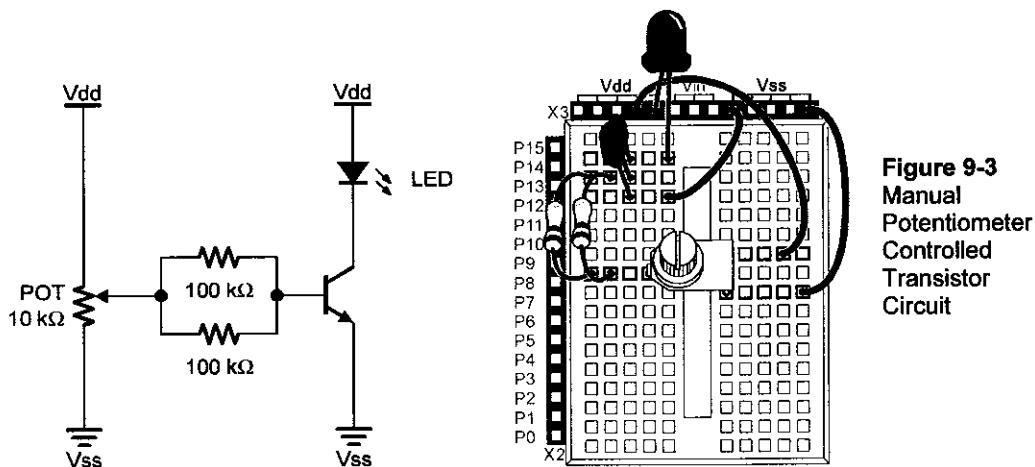


- (1) Potentiometer – 10 k $\Omega$
- (3) Jumper wires

**Building and Testing the Transistor Circuit**

Figure 9-3 shows a circuit that you can use to manually control how much current the transistor allows through the LED. By twisting the knob on the potentiometer, the circuit will deliver different amounts of current to the transistor's base. This will cause a change in the amount of current the transistor allows to pass from its collector to its emitter. The LED will give you a clear indication of the change by glowing more or less brightly.

- √ Build the circuit shown in Figure 9-3.
- √ Turn the knob on the potentiometer and verify that the LED changes brightness in response to a change in the position of the potentiometer's wiper terminal.



**Figure 9-3**  
Manual  
Potentiometer  
Controlled  
Transistor  
Circuit

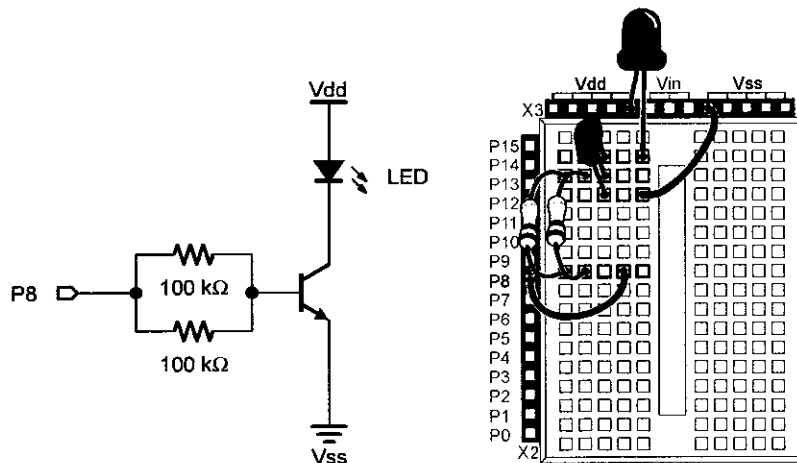
**Your Turn – Switching the Transistor On/Off**

If all you want to do is switch a transistor on and off, you can use the circuit shown in Figure 9-4. When the BASIC Stamp sends a high signal to this circuit, it will make it so that the transistor conducts as much current as if you adjusted the potentiometer for maximum brightness. When the BASIC Stamp sends a low signal to this circuit, it will cause the transistor to stop conducting current, and the LED should emit no light.



What's the difference between this and connecting an LED circuit to an I/O pin? BASIC Stamp I/O pins have limitations on how much current they can deliver. Transistors have limitations too, but they are much higher. In the *Industrial Control Student Guide*, a transistor is used to drive a small DC fan. It is also used to supply large amounts of current to a small resistor that is used as a heating element. Either of these two applications would draw so much current that they would quickly damage the BASIC Stamp, but the transistor takes it in stride.

- ✓ Build the circuit shown in Figure 9-4.
- ✓ Write a program that sends high and low signals to P8 twice every second. HINT: LedOnOff.bs2 from Chapter #2 needs only to be modified to send high/low signals to P8 instead of P3. Remember to save it under a new name before making the modifications.
- ✓ Run the program and verify that it gives you on/off control of the LED.



**Figure 9-4**  
Circuit that  
Gives BASIC  
Stamp  
Transistor  
On/Off Control

9

## ACTIVITY #2: INTRODUCING THE DIGITAL POTENTIOMETER

In this activity, you will replace the manually adjusted potentiometer with an integrated circuit potentiometer that is digitally adjusted. You will then program the BASIC Stamp to adjust the digital potentiometer, which will in turn adjust the LED's brightness in the same way the manual potentiometer did in the previous activity.