DO-IT-YOURSELF
BREADBOARD
CIRCUITS

NICERC and Parallax have partnered to bring you Do-It-Yourself Breadboard Circuit kits. With one kit, you can create seven different breadboard builds as an introductory activity to circuits, breadboards, and components often used in robotics and electronics.

One kit includes supplies for the following circuit builds:

1. Single LED: Light an LED
2. Single Push Button: Control an LED using a push button
3. Photoresistor-dimmed LED: Change an LEDs intensity with a photoresistor
4. Double Push Button: Alternate active LEDs using a push button
5. Photoresistor Blinking LEDs: Alter LEDs blinking frequency based on environmental light
6. Push Button Buzzer: Cause a buzzer to sound by pushing a button
7. Photoresistor Theremin: Control the tone of a push button buzzer using a photoresistor

Purchase kits at www.parallax.com

BEFORE YOU BEGIN
PREPPING YOUR BREADBOARD

1. Adhere the breadboard to the designated place on the insert card included in your kit. The card has guides to help you identify the breadboard column letters and row numbers.
2. Get to know your components.

- Jumper wires (10)
- 555 integrated circuit chip (1)
- Push button (1)
- Photoresistor (1)
- 220Ω (Red, Red, Brown, Gold)
- 1000Ω (Brown, Black, Red, Gold)
- Breadboard (1)
- Resistors (2)
- LEDs (2)
- Battery (1)
- Battery holder (1)
- Piezo speaker (1)
- Capacitor (1)
SINGLE LED

Light an LED using a breadboard, 2 jumper wires, an LED, battery, and battery holder.

1. Insert the black jumper wire into the breadboard from A5 to A14.
2. Insert the red jumper wire into the breadboard from J5 to J14.
3. Place the red LED into row 15 with the positive (longer) leg connecting to the right side, lining up with the red wire and the negative (shorter) leg on the left lining up with the black wire.
4. Insert the battery into its battery holder, writing side up. Place the battery holder in the breadboard, connecting negative to the black wire and positive (the clip side) to red.
5. The LED should come on.

If the LED does not light up, check for the following:

• Is your LED in backwards?
• Are the jumper wires in the same row as the LED leads?
• Are the jumper wires in the same row as the battery terminals?

BUILD 2

SINGLE LED PUSH BUTTON

Control an LED using a push button, breadboard, 2 jumper wires, an LED, battery, and battery holder.

1. Insert the black jumper wire into the breadboard from A5 to A16.
2. Insert the red jumper wire into the breadboard from J5 to J12.
3. Place the push button horizontally in the middle of the breadboard so the bottom left pin is on row 16 lined up with the black jumper wire.
4. Place the red LED into the breadboard with the positive (longer) leg inserted into H15 and the negative (shorter) leg into G17, next to the top right pin of the push button.
5. Place the battery in its holder into the breadboard connecting negative to black and positive (the clip side) to red.
6. Press the push button. The LED should come on when you hold the button down, and go off when you release it.

If the LED does not light up when you press the push button, check for the following:

• Is your LED in backwards?
• Are the jumper wires in the same rows as the LED leads and push button?
• Are the jumper wires in the same row as the battery terminals?

All images were created using Fritzing.
**BUILD 3**

**PHOTORESISTOR-DIMMED LED**

Change an LEDs intensity with a photoresistor, breadboard, 2 jumper wires, an LED, photoresistor, battery, and battery holder

1. Insert the black jumper wire into the breadboard from A5 to A12.
2. Insert the red jumper wire into the breadboard from J5 to J13.
3. Place the green LED into the breadboard with the positive leg (longer of the two legs) inserted into F13 and the negative leg into E13.
4. Insert the photoresistor into the breadboard from C12 to D13.
5. Insert the battery into its battery holder and place it in the breadboard connecting negative to black and positive to red.
6. The green LED should light up. Hold your finger over the photoresistor to dim the LED.

**BUILD 4**

**DOUBLE LED PUSH BUTTON**

Alternate active LEDs using a push button, breadboard, 2 jumper wires, resistor, 2 LEDs, battery, and battery holder.

1. Insert the black jumper wire into the breadboard from A5 to A11.
2. Insert the red jumper wire into the breadboard from J5 to J11.
3. Insert the 220Ω resistor into the breadboard from I11 to I15.
4. Place the push button horizontally in the middle of the breadboard so the top pins are on row 15 and opposite sides of the breadboard.
5. Place the red LED into the breadboard with the positive (longer) leg inserted into C17 and the negative (shorter) leg into B11.
6. Place the green LED into the breadboard with the positive (longer) leg inserted into G15 and the negative (shorter) leg into E11.
7. Insert the battery into its battery holder and place it in the breadboard connecting negative to black and positive to red.
8. The green LED should light up when the button is not pressed. Hold the button down, and the red LED should turn on while the green LED turns off.

*All images were created using Fritzing.*
1. Insert the black jumper wire into the breadboard from A3 to A12.
2. Insert the red jumper wire into the breadboard from J3 to J12.
3. Place the 555 integrated circuit chip into the middle of the breadboard with the top pins on row 12. The chip’s top left pin is marked with a circle on the case.
4. Insert a jumper wire into the breadboard connecting D15 to G12.
5. Insert a jumper wire into the breadboard connecting D13 to G14.
6. Insert the 1000Ω resistor into the breadboard from C14 to H17.
7. Insert the photoresistor into the breadboard from B13 to B14.
8. Insert the capacitor into the breadboard from A13 to B12.
9. Place the green LED into the breadboard with the positive (longer) leg inserted into F17 and the negative (shorter) leg into C12.
10. Place the red LED into the breadboard with the positive (longer) leg inserted into I12 and the negative (shorter) leg into J17.
11. Insert the battery into its battery holder and place it in the breadboard connecting negative to black and positive (the clip side) to red.
12. Both LEDs should come on, blinking so fast they appear to be on all the time. Cover the photoresistor with your finger and the blinking should slow down so you can see it.

All images were created using Fritzing.
Cause a buzzer to sound by pushing a button using a breadboard, 4 jumper wires, 555 chip, resistor, 2 resistors, capacitor, push button, piezo speaker, battery, and battery holder.

1. Insert the black jumper wire into the breadboard from A1 to A11.
2. Insert the red jumper wire into the breadboard from J1 to J11.
3. Place the 555 integrated circuit chip into the middle of the breadboard with the top pins on row 11. The chip’s top left pin is marked with a circle on the case.
4. Insert a jumper wire into the breadboard connecting D12 to G13.
5. Insert a jumper wire into the breadboard connecting D14 to G11.
6. Insert the capacitor into the breadboard from A12 to B11.
7. Insert the 220Ω resistor into the breadboard from C12 to C13.
8. Place the pushbutton horizontally in the middle of the breadboard so the top pins are on row 15 and opposite sides of the breadboard.
9. Insert the piezo speaker into the breadboard with the positive pin in A9 and negative to A6.
10. Insert the 1000Ω resistor into the breadboard from E6 to A13.
11. Insert a jumper wire into the breadboard connecting C9 to D15.
12. Insert a jumper wire into the breadboard connecting G17 to I11.
13. Insert the battery into its battery holder and place it in the breadboard connecting negative to black and positive to red.
14. Hold the button down to make the piezo speaker buzz.
1. Insert the black jumper wire into the breadboard from A1 to A11.
2. Insert the red jumper wire into the breadboard from J1 to J11.
3. Place the 555 integrated circuit chip into the middle of the breadboard with the top pins on row 11.
4. Insert a jumper wire into the breadboard connecting D12 to G13.
5. Insert a jumper wire into the breadboard connecting D14 to G11.
6. Insert the capacitor into the breadboard from A12 to B11.
7. Insert the photoresistor into the breadboard from C12 to H13.
8. Place the pushbutton horizontally in the middle of the breadboard so the top pins are on row 15 and opposite sides of the breadboard.
9. Insert the Piezo speaker into the breadboard with the positive pin in A9 and negative to A6.
10. Insert the 1000Ω resistor into the breadboard from E6 to A13.
11. Insert a jumper wire into the breadboard connecting C9 to 15D.
12. Insert a jumper wire into the breadboard connecting G17 to I11.
13. Insert the battery into its battery holder and place it in the breadboard connecting negative to black and positive to red.

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