Power Reversing Circuits (Novice Option)

Name: _____   Date: _____

Introduction:

A power reversing circuit is used to control which direction a DC motor turns. Power reversing circuits are incredibly versatile circuits and can be used for a wide variety of applications. For instance, these simple circuits can be used to control simple devices such as a crane winch; however, if you have two or more power reversing circuits you can control advanced robotic devices such as a battle-bots.

In the field of electoral engineering power reversing circuits are commonly referred to as an "*H-Bridge*". This is because the most basic *H-Bridge* design contains four switching element, with the load at the centre, in an H-like configuration:

H-Bridge: Noun
A simple circuit that lets you control a DC motor to go backward or forward.
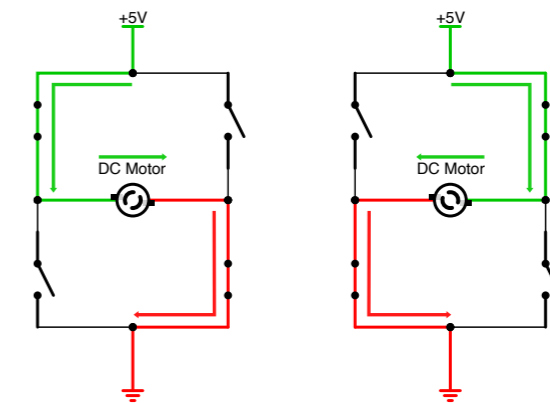
A simple H-Bridge using 4 simple switches.
The flow of electricity is marked with arrows.

More advanced H-Bridge designs build on this one simple circuit design. A slightly more efficient design will replace the 4 one way switches with 2 SPDT (single pole double throw) switches, or with 1 DPDT (double through double pole) switch. However the most popular H-bridge design uses transistors and can be controlled using a simple control circuit or computerized microcontroller.

*H-Bridge designs using transistors [**NOTE:** although the circuit can work using only transistors, diodes are usually added to protect the transistors from power surges that are caused by the motor].*

Instructions

The novice H-bridge option has the choice of 2 different power reversing circuits that you can attempt. Each circuit has its own construction obstacles, advantages, and disadvantages in how it operates. Your task is to select one circuit design, built it, test it, and then explain how the circuit works.

Both the "*Push to Activate*" and the "*Push to Deactivate DPDT H-Bridge*" circuits uses *1 DPDT* (*Double Pole Double Throw*) switch and *1 push switch*; however, both circuits operate very differently despite using the same components and a similar circuit design.

Questions

1. What is the difference between a **DPDT switch** and a **push switch**?

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2. Review the electrical schematics for both circuit options and then explain why the two circuits work differently from one another.

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3. Which circuit did you decide to build? Why did you chose to build this particular circuit variation? What advantages does this circuit have over the other circuit design which will make it a better choice for your final project?
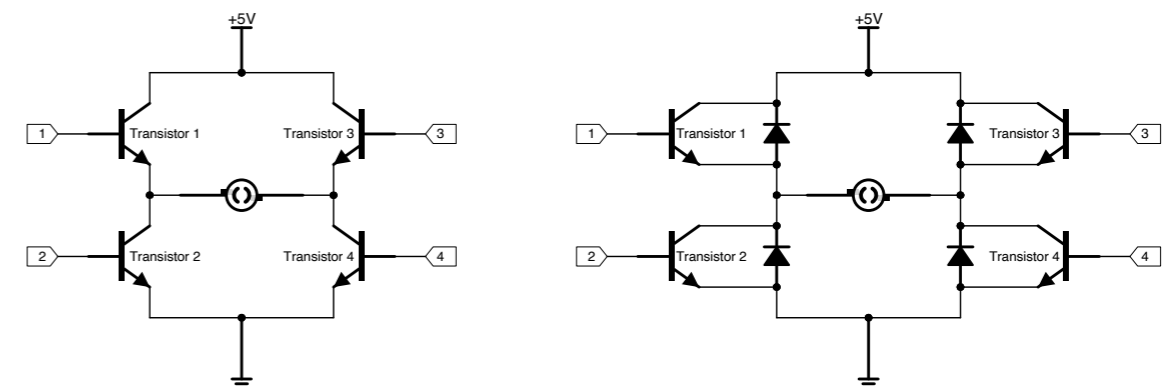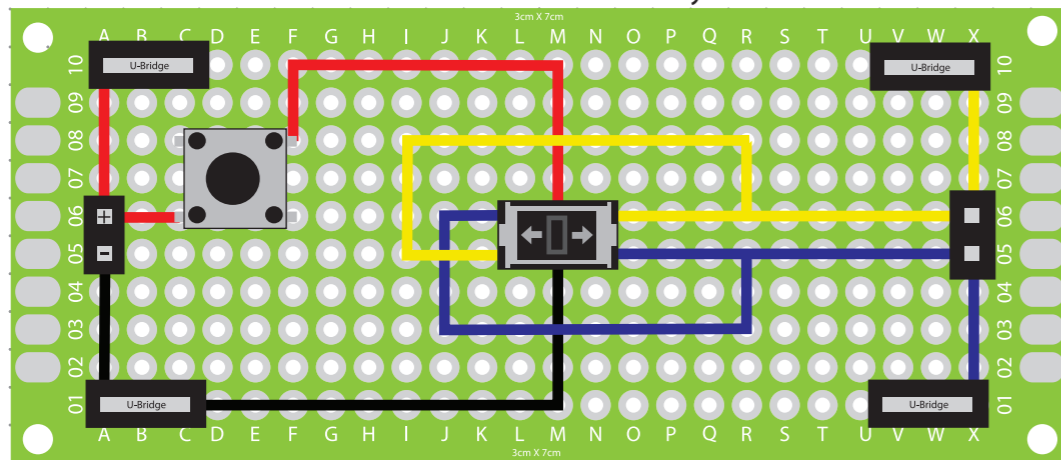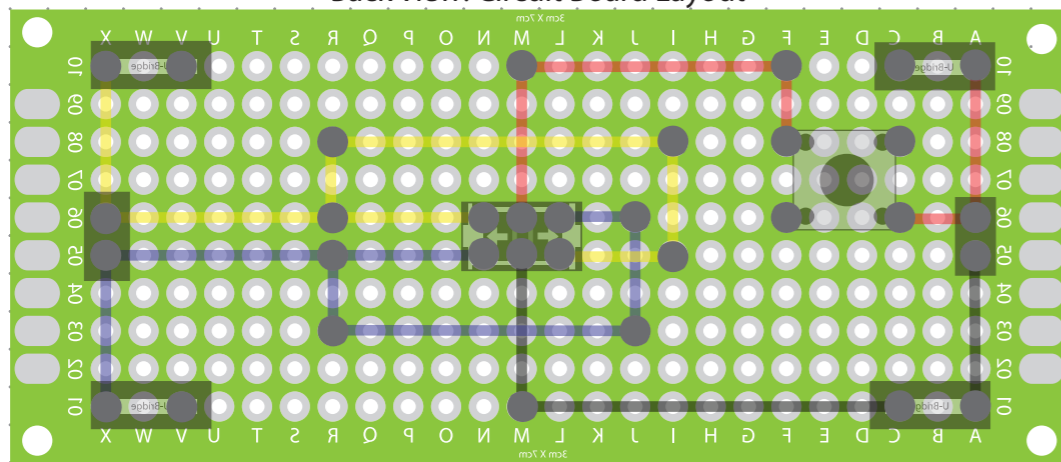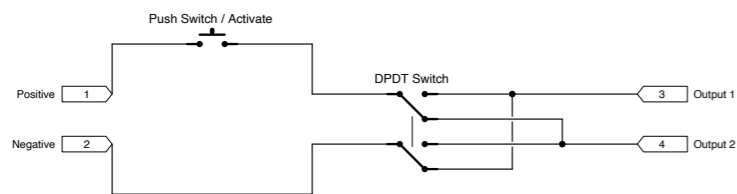
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Front View: Circuit Board Layout

Back View: Circuit Board Layout

Electrical Schematics

Push Switch / Activate

Positive 1

Negative 2

DPDT Switch

3 Output 1

4 Output 2

Materials:

1	3x7cm Circuit Board
4	Bridge Pins
4	U-Bridges
1	Push Switch
1	DPDT Switch
4	Colors of Assorted Wires

Project: Push to Activate DPDT H-Bridge

Client:

Designer: Scott A. Campbell

Builder:

5mm Dot Grid
Scale:
2:1

Front View: Circuit Board Layout

Back View: Circuit Board Layout

Electrical Schematics

Positive 1

Negative 2

Push Switch / Emergency Stop

DPDT Switch

3 Output 1

4 Output 2
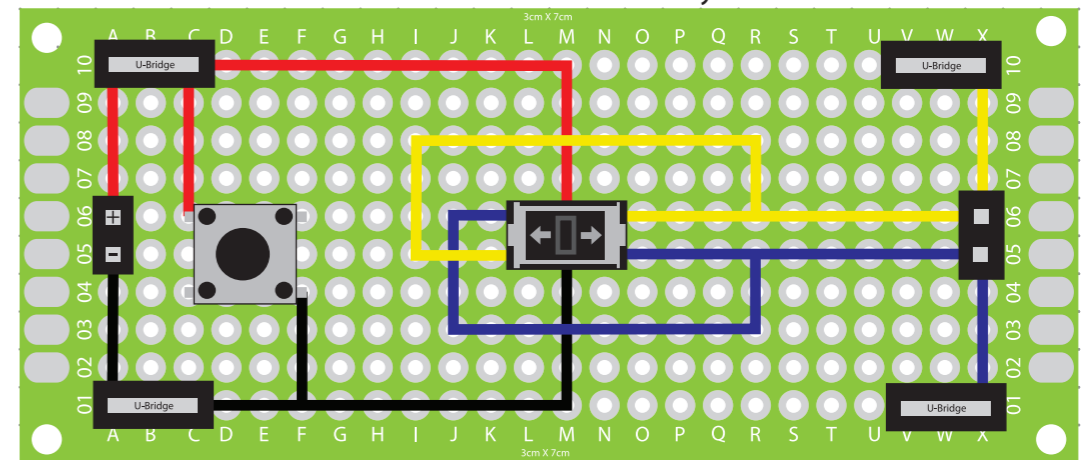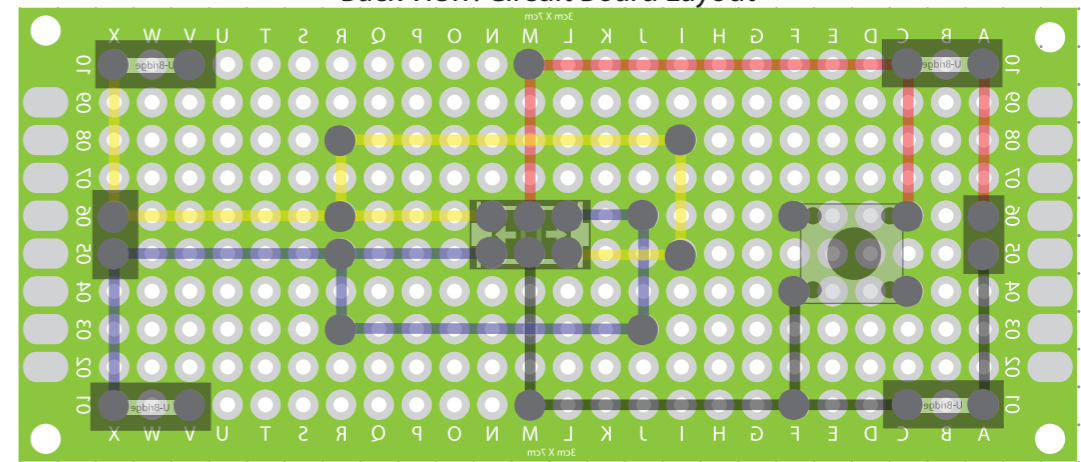
Materials:

1	3x7cm Circuit Board
4	Bridge Pins
4	U-Bridges
1	Push Switch
1	DPDT Switch
4	Colors of Assorted Wires

Project: Push to Deactivate DPDT H-Bridge
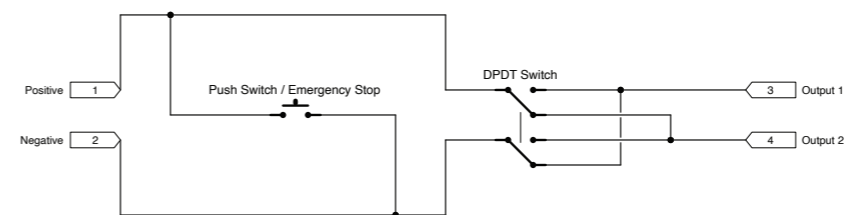
Client:

Designer: Scott A. Campbell

Builder:

5mm Dot Grid
Scale:
2:1