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Tip120 & Tip122 Transistor Switching Circuit

This excellent tutorial was created by Rich Pyke, and has been posted on his behalf.
This Tutorial will go through the steps for making a TIP120 and TIP122 transistor switching circuit. These can be used much like a relay or switch for turning on and off a string of LED's for example, but have the added bonus of using PWM (pulse width modulation) so you can adjust the brightness of the LED's. This became an evolving tutorial with additional information and options available being added. The change log at the end of this post explains changes made. Any additional information will be added as and when discovered.

Last Updated: 10/16/2015

Parts Needed.

! 1 x TIP120 or TIP122 Darlington Transistor or IRL3103PBF
! Mosfet (see notes at the end)
! 1 x 1k ohm Resistor
! 1 x Small Piece of Strip Board (7x5 holes)
! 1 x Pin Header (1x2)
! 1 x Servo Extension
! Solder
! Soldering Iron
! Cutters
Extra parts needed (if inductive load):
! 1 x 1n400x Diode as required
Search for part numbers in google or eBay, or use your preferred supplier.

Schematics.

The following images are the Schematics for the circuits...

Underside of Board:

The optional connections are for Diode D1 covered at the end of this post.

Step 1. Method:

1.) Solder the TIP transistor to the strip board so each pin is on a separate strip of copper.

Step 2.

2.) Solder the resistor from the Base of the transistor to a spare copper strip.

Step 3.

3.) Cut off the end of a Servo Extension and strip back the wires.
4.) Solder the Black wire of the Servo Extension to the strip connected to the Emitter of the transistor.
5.) Solder the White wire of the Servo Extension to the strip connected to the end of the resistor (not the transistor end).
6.) Solder the Red wire to a spare copper strip.

Step 4.

7.) Use a small off cut from the Servo Extension and solder one end to the strip of the Collector of the transistor.
8.) Solder the other end of the off cut to a spare copper strip next to the Red wire.

Step 5.

1. Solder the Pin Header to the copper strips with the red and black wires soldered.

Step 6.

10.) Job done. Plug the Servo Extension in to a Digital port on the EZB and connect the circuit that needs switching to the Pin Header, I do this with another Servo Extension (as I have hundreds of them).

Or a JST connector works very well also...

Step 7.

Adding the Diode.
If using the circuit for a motor or other inductive load a diode needs adding between the transistor Collector and Emitter. This is easily added in to the previous circuit.
11.) Bend the leg on the Diode so it will fit though 0.1" hole spacing

Step 8.

12.) The band on the diode is to connect to the Collector and the other end to the Emitter. It will drop in to two spare holes.

Step 9.

13.) Solder in place and cut off the excess legs.

Final Step.

1. All done. You should have something like this...

Additional notes
You may also use a Mosfet for this switching circuit. A IRL3103PBF mosfet can replace the TIP120/122 Darlington transistor. The circuit is the same however the pins on a Mosfet are named Gate, Drain and Source. The mosfet fits in the same place as the Darlington with the Gate to the left (replacing the Base of the Darlington).
Updates:
Edit 1 (7th March 2013):
Underside of board diagram added.
Edit 2 (7th March 2013):
For some circuits a diode is needed as shown in the first schematic. The board here does have space for a diode (C4 to D4 - would have to be with legs bent to accommodate 0.1" spacing) however I have not shown one - watch this space.
Edit 3 (7th March 2013):
Underside of board optional connections for D1 added.
Edit 4 (7th March 2013):
Added diode information.
Edit 5 (18th March 2013):
Added IRL3103 Mosfet information.