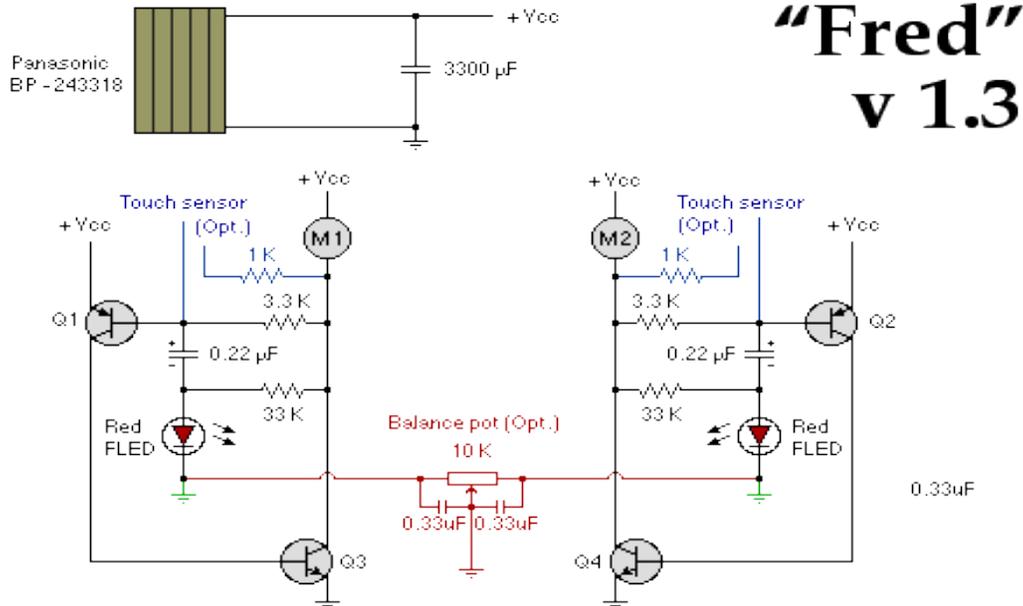


# THE "FRED" POPPER



Q1, Q2 BC327-25  
Q3, Q4 BC337

Note: (Opt.) = Optional: This component isn't absolutely necessary.  
The transistors can be replaced with 2N3904 and 3906's.  
Any colour FLED should work fine.

The red part of the circuit is there to balance your FRED if he is always turning to one side. If you use matched FLEDs then use the green part instead.

This photopopper circuit is built from two "Fred" solarengines wired together.

Ben Hitchcock has the following debugging tips on Fred poppers:

A) If you can see Fred's eyes flashing (no motor movement), then:

- 1) Grab a piece of wire, and connect one end to the negative terminal on the capacitor. Put your Fred under a lamp, or put him in sunlight, until the eyes start to flash.

2) Touch the wire to the base of the PNP transistor.

3i) If the motor moved, then the problem is with the 33k resistor, the 3.3k resistor, the 0.22 uF capacitor, or the FLED connections.

3ii) If the motor didn't move, then the problem is with the transistor connections.

B) If Freds eyes never flash (no motor movement):

1) Check the solar panel and capacitor connections.

2) Short out the capacitor, and then watch the FLEDs closely. If one flashes faintly, then stops and doesn't flash again, then you may have a bad motor connection.

3) If this doesn't happen, then go over the whole robot component by component.

C) If the motor makes funny noises but doesn't fire:

1) Try putting a 1 uF capacitor across the motor terminals.

2) Try using a physically bigger storage capacitor (like a 2200 uF 16V).

D) If the motor fires strongly once when you put it in light, but then is either weakly on all the time or stops and doesn't pop again:

1i) Your solar panel is too big. Put some tape across it or put it inside, to lower the amount of current it can produce.

1ii) Your motors are too efficient. Put a 100 ohm resistor across your motor terminals.

2) Send me some of your motors or solar panels, because you are obviously too rich, and need to scavenge more (lower quality) parts.

Source: [http://www.solarbotics.net/library/circuits/bot\\_popper\\_fred.html](http://www.solarbotics.net/library/circuits/bot_popper_fred.html)