Break lights & failsafe for rc controlled nitro cars

Evert Dekker 2007

Description

This device will light up LED's if the car is breaking, monitor the reception and quality of the received signal from the transmitter and the battery strength. With setpoint learning function.

Definition

Using some very high power (10000 mcd) led's to add break light's to the car is looking cool, and it can be handy to see when the car is stopping. Used in nitro RC cars as a way to make sure you don't suffer the consequences of an out-of-control RC car doing 50+ km/h, a fail safe device is connected between the receiver and throttle servo of the car. It monitors the connection between the transmitter and receiver for disruption and/or interference, as well as total battery pack strength. Failures such as lost signal, frequency interference, or low battery (< 4.2V) will automatically engage the rc cars breaking system, stopping or slowing down the RC car. These little lifesavers can provide peace of mind and are a fairly cheap way to avoid costly repairs that result from runaways and crashes due to signal problems. Setpoints for failsafe and break lights are easy learned with a touch of the button.

History

It would be fun to have some break lights on my radio controlled nitro car. Searching the net i couldn't find anything, except a mechanical solution, connecting a switch to the throttle servo, but for my off the road car that's not reliable The disadvantage of a rc car with a nitro motor is that there is no electronics to connect the led's to. Controlling the speed and break, everything is done with one servo. After some brain storming how to make this simple and reliable. I came to the solution to measure the length of the pulse that's applied to the servo. If you know the length of the puls then you know the position of the servo. Idea is born……and with Bascom-avr simple to build.
My car had already a simple failsafe device that will stop the car if the signal was lost. This device was working analogue. Two devices in one car is too much, so combine both together in a very compact design.

Circuit description

The circuit is a very simple and straight design.
My receiver is powered with 4x 1.5V battery, but the receiver has build in voltage regulator of 5V, therefore there is no voltage regulator on this device. It must be operated at 5V. I don't know if all manufactures of rc receivers use 5V so check this first. I'm using a Futaba receiver so the pins are aligned for me for easy connecting.
U2 is connected to the receiver. Pin 1 is gnd, pin 2 +5v and pin 3 the servo signal. This signal is direct connected to the Tiny45. To protect the Tiny45 for spikes etceteras a zener diode(D1) of 5.2V is added. R1 is holding the reset high. R3 and R4 are a voltage divider to measure the battery voltage. In this device the Tiny45 uses the 2.54V internal reference as reference. To decouple the Tiny45 C1 is added. R2 is the current limitor for the led's. And finally U1 is the outgoing connector to the servo and led's. Pin 1 is again the ground, pin 2 +5v and pin 3 outgoing servo pulses. So you can connect your servo to pins 1 t/m 3. Pin 4 is the cathode for the led's and 5 the anode.

Notice that the button is upside down on the pcb, with a 4mm hole drilled in the pcb and the connecting leads bend, you must operate the button from the other side of the pcb. The pcb is now protecting the button for unwanted pressing. (Smart !)

Manual

- *Set the breaklight on point*
  Place the servo with the throttle stick on your transmitter in the position where the breaks are applied. Press the button short. (Shorter then 3 sec).
  The led's will flash 1x to confirm and the setting is saved to eeprom
- *Set the failsafe position*
  Place the servo with the throttle stick on your transmitter in the position where you want your servo to go in case of a malfunction, the failsafe position.
  Press the button long (longer then 3 sec)
  The led's will flash 2x to confirm and the setting is saved to eeprom
- *Set the rotation direction for breaking*
  If your servo is not breaking when it turns clockwise (cw), but it turns counter clockwise (ccw), then the led's are lit when you throttle. To change this you switch on the device with the button pressed. This will toggle between both options'. If the led's flashes 1x then it works cw, with 2 flashes it's ccw.

- When the battery voltage of the receiver is to low, lower then 4.2V, the servo will turn in the failsafe position. The led's will flash with a interval of 75ms. If the device is in the low voltage routine, the only way to resume is to switch it off and on again, but keep in mind that this is a warning that you must replace the batteries.